354.931
N48
1940/41

NEW ZEALAND.

PUBLIC WORKS STATEMENT.

1941.

BY THE

Hon. H. T. ARMSTRONG,
MINISTER OF PUBLIC WORKS.

WELLINGTON.
BY AUTHORITY: E. V. PAUL, GOVERNMENT PRINTER.
1941.

THE LIBRARY OF THE
SEP 10 1962
UNIVERSITY OF ILLINOIS

NEW ZEALAND.

PUBLIC WORKS STATEMENT.

1941.

BY THE

Hon. H. T. ARMSTRONG,

MINISTER OF PUBLIC WORKS.

WELLINGTON.
BY AUTHORITY: E. V. PAUL, GOVERNMENT PRINTER.
1941.

354.931
N48
1940/41

INDEX.

HON. MINISTER'S STATEMENT.

	PAGE
Finance Statement: Expenditure, 1940–41, Public Works Fund	viii
Receipts, Public Works Department, 1940–41	viii
Summary of Votes under Control of Minister of Public Works for Year ending 31st March, 1942	x
Summary of Votes under Control of Ministers other than Minister of Public Works, Year ending 31st March, 1942	x
Main Highways	x
Hydro-electric Development	xi
Railway-construction	xiv
Railways: Improvements and Additions to Open Lines	xv
Road-construction	xvi
Irrigation and Water-supply	xvii
Public Buildings—	
New Departmental Buildings	xviii
Agriculture	xviii
Courthouses	xix
Health and Hospital Institutions	xix
Mental Hospitals	xix
Police-stations	xix
Post and Telegraph Buildings and Land	xx
Prisons	xx
Scientific and Industrial Research	xx
Education Buildings	xxi
Telegraph Extension	xxi
Tourist and Health Resorts	xxii
Lands Improvement	xxii
Small Farms Development	xxiv
Swamp Land Drainage	xxiv
Lighthouses and Harbour Works	xxiv
Native Land Settlement	xxv

TABLES.

No. 1.—Total Expenditure: Summary showing Total Expenditure out of Public Works Fund	1
No. 2.—Yearly Expenditure out of Public Works Fund (General Purposes Account), 1919–20 to 1940–41	2–7
No. 3.—Railway Statement showing Expenditure on Construction of Railways to 31st March, 1941	8–10
No. 4.—Expenditure and Liabilities on Public Buildings out of Public Works Fund to 31st March, 1941	11
No. 5.—Electric Supply Account: Statement of Accounts as at 31st March, 1941	12–19

10552 dig of 1940/41, 1940/41, 1944/45 ar 35

INDEX—*continued.*

TABLES—*continued.*

Electric Supply Tables (North Island and South Island Electric-power Systems)— PAGE

No. I.—Financial and Operating Statistics for Year ended 31st March, 1941 58–59

No. II.—Analysis of Capital Outlay as at 31st March, 1941 60

No. III.—Analysis of Operating Costs for Year ended 31st March, 1941 61

Main Highways Tables—

No. 1.—Maintenance of Main Highways (including Bridges) 65

No. 2.—Construction Work completed during the Year 1940–41 66

No. 3.—Extent and Types of Work carried out since 1924 67

No. 4.—Lengths of Main Highways metalled and surfaced since Inception of Board's Operations (9th June, 1924) 67

No. 5.—Annual Main Highways Accounts as at 31st March, 1941 78–80

No. 6.—Length of Main Highways at 31st March, 1941 81

No. 7.—Tests of Stone completed during the Year ended 31st March, 1941 82

APPENDICES.

Appendix A.—Expenditure for the Year: Audited Statement of Expenditure out of Public Works Fund for the Year 1940–41 20–21

Appendix B.—Annual Report on Public Works by the Engineer-in-Chief 22–35

Appendix C.—Annual Report on Public Buildings by the Government Architect 36–39

Appendix D.—Annual Report on Electrical Works and Water-power Schemes by the Chief Electrical Engineer 40–57

Appendix E.—Seventeenth Annual Report on Main Highways by the Main Highways Board 62–77

1941.
NEW ZEALAND.

PUBLIC WORKS STATEMENT

(BY THE HON. H. T. ARMSTRONG, MINISTER OF PUBLIC WORKS).

Mr. Speaker,—

In accordance with the provisions of section 8 of the Public Works Act, 1928, I submit my report on works carried out during the year ended 31st March, 1941, together with a statement of expenditure certified by the Controller and Auditor-General.

As I assumed the office of Minister of Public Works only in February last, this report relates more particularly to public-works activities which were directed by my colleague, the Hon. R. Semple, during the greater part of the year.

In the Statement presented to the House last year reference was made to the Government's decision to curtail public-works construction and to confine activities principally to those undertakings which had reached an advanced stage where completion should be effected and where special considerations demanded.

The effect of this policy is seen in the reduced expenditure under the General Purposes Account of the Public Works Fund, which for the past year amounted to £6,280,127, as against £9,238,447 for the preceding year, a decrease of £3,000,000.

Honourable members will appreciate that the public-works organization has not been engaged entirely upon operations normally associated with the public-works programme. The resources of the Department in respect of staff, men, and material have been utilized by the Government for the prosecution of a large amount of work arising directly from the war and which has been financed from the War Expenses Account. It would be erroneous, therefore, to assume that the scope of purely public-works activities is reflected by the actual operations of the Department. In order to afford a reasonable conception of the position it can be said that approximately one-third of the activities of the Department over the last twelve months has been absorbed by special war work carried out at the request and on behalf of the Army, Navy, and Air Departments, the cost being a charge against the War Expenses Account.

The military works carried out by my Department were numerous and extensive and comprised the design and erection of many hutments, administrative buildings, stores, and hospitals, including major institutions for the reception and treatment of returning sick and wounded, as well as other works of a special nature. The installation of water-supplies, electrical equipment, drainage systems, food cooking and storage appliances, and fire-fighting and miscellaneous services also represented undertakings of some magnitude, particularly where large concentrations of troops were to be accommodated.

The progress of important national works the completion of which is fully justified and, indeed, necessary, has been affected by a shortage of men and material, a condition arising from the existing world situation.

At the end of the financial year the total number of men employed on all works controlled by the Department was 14,797, a reduction of 4,734 compared with the number at the commencement of the year. Of the 14,797 men, 3,051 were employed by contractors working for the Department, 1,940 were employed by local bodies on public works subsidized through the Department, leaving 9,806 men paid directly by the Department. Included in this latter figure are 2,877 men employed solely on defence works.

The release of officers and men for military service, a large number of whom volunteered, has been such that the remaining personnel has been called upon to work under extreme pressure in order to meet the many urgent demands of the present. I mention for the information of honourable members that at the end of the year 485 members of the staff and 1,912 workmen were serving with the overseas forces. Apart from the ordinary field companies of engineers, which included many Public Works Engineers, eight specialist engineering units have been sent overseas. The majority of the officers and men of these companies were drawn from the Public Works Department; consequently it will be realized that the drain on the professional and technical staff of the Department has been very severe. The Government has also released from public works a considerable number of men who were required in essential industries related to the nation's war work.

To some extent the shortage of materials, previously obtained from abroad, has been met by the use of substitute products manufactured in New Zealand under the Government's plan for developing secondary industries. The main difficulty, however, has been to secure regularity in the supply of structural and reinforcing steel for essential works, with consequent unavoidable delays in time schedules. By redesigning minor proposals wherever possible, the demand for imported steel has been reduced to a minimum.

During the year under review the principal public-works activities consisted of the continuation of projects already in hand at the outbreak of war. One of the most important programmes is that relating to the extension of the hydro-electric-power supply. The demand for electric power has been increasing at such a rate that particularly in the North Island the output from additional generating units now being installed will be almost absorbed as soon as they can be brought into operation. Without the use of standby plants at peak periods the present North Island supply systems could not meet existing demands. The urgency of providing additional supply will therefore be fully appreciated, especially in view of the industrial developments which are taking place. Unfortunately, the shortage of experienced men and the uncertain delivery of machinery and equipment from overseas have delayed the completion of some extension works which have reached an advanced stage. Railway-construction and irrigation schemes have been carried forward, and reasonably good progress has been achieved under the prevailing circumstances.

The erection of certain major public buildings has been continued in order to provide much-needed accommodation, and as structural operations are generally well advanced it is hoped that most of these will reach completion in the early future. Expenditure on main highways and settlement roading, which shows an appreciable reduction on the previous year's figures, has been confined to the works already in progress or those which presented special merit and urgency.

The estimates for the current year have been framed in keeping with the expressed policy of low-level public-works expenditure during the war.

The question of legislation to provide comprehensive measures for river-control throughout the Dominion has received further consideration. Draft proposals were prepared by my Department, which expressed the view that the important matter of soil-conservation should be dealt with in conjunction with river-control. In March last this House appointed a Select Committee to inquire into and report upon such questions relating to the protection of property from damage by floods and erosion and to the control of rivers generally as might be referred to it by the Government, and the Department's draft proposals have been under examination by that Committee.

The Committee has received and considered representations made by local authorities and other interested parties and has submitted important recommendations to the Government. As a result of these recommendations legislation is being drafted for submission to honourable members.

It is realized that after the war a large number of men will be returning from overseas service who will not be able to resume immediately their former occupations or who will require to be specially trained in vocations best suited to their individual circumstances. In the interim other work may have to be provided for some of these men, and with this object in view careful consideration is being given to the selection of national development works where they could be employed pending their rehabilitation in normal civil occupations.

A comprehensive schedule of important post-war projects has been compiled, including provision for flood-control and soil-conservation measures, the improvement of access and transport facilities, and the resumption of construction programmes which have been suspended during the war.

It will be appreciated that in respect of new proposals extensive detailed surveys and investigations would be required in many cases before activities could be launched, and this factor is receiving close attention. The estimates this year include an item for rehabilitation surveys, and although at present the shortage of professional staff does not allow of much being done in this direction it is anticipated that later in the year, when staff becomes available from the urgent national defence works now in hand, some of the required surveys will be commenced.

I desire to place on record the Government's appreciation of the services of Mr. John Wood, who retired from the positions of Engineer-in-Chief and Under-Secretary on the 28th February, 1941, having held these offices for more than four and a half years. Mr. W. L. Newnham has been appointed as his successor.

I wish also to acknowledge the loyal and efficient co-operation given by officers and workmen in carrying out the various works entrusted to the Public Works Department, many of which had to proceed under conditions of urgency associated with the Dominion's war requirements.

With deep regret I mention the fact that of those members of the staff who left New Zealand on military service, fourteen have made the supreme sacrifice and several have been wounded or posted as missing. Three officers serving abroad in the Air Force have been decorated for conspicuous bravery.

FINANCE.

The payments and receipts and accumulated totals in connection with the Public Works Fund and other associated votes and accounts for the year 1940–41 are shown in the tabulation following.

The gross expenditure amounted to £20,327,529, of which £4,267,869 was expended by other Government Departments; the recoveries in reduction of expenditure amounted to £7,317,521, of which £1,362,390 was recovered by other Departments; the net expenditure totalled £13,010,008, of which £2,905,479 was expended by other Departments.

In addition, the Department collected £2,042,896 for the supply of electric energy, irrigation receipts, and miscellaneous revenue from other sources.

Class of Work.	Expenditure, 1940–41.			Total Net Expenditure to 31st March, 1941.
	Gross.	Recoveries.	Net.	
EXPENDITURE, PUBLIC WORKS FUND.				
Railways—	£	£	£	£
New construction	945,908	87,976	857,932	43,647,338
Improvements and additions to open lines	1,119,202	47,042	1,072,160	26,259,008
Roads	650,560	51,547	599,013	28,040,362*
Public buildings	1,478,008	35,577	1,442,431	19,336,832†
Lighthouses, harbour-works, and harbour defences	35,413	1,059	34,354	1,425,345
Tourist and health resorts	23,634	2,059	21,575	828,103
Telegraph extension	531,280	275,226	256,054	13,549,466
Departmental	587,583	537,604	49,979	3,794,004
Irrigation, water-supply, and drainage	672,309	61,271	611,038	2,577,805
Lands-improvement	267,031	24,073	242,958	1,651,845
Swamp-land drainage	13,184	9,237	3,947	109,512
Small farms development	828,349	257,134	571,215	2,429,824‡*a*
Native-land settlement	1,011,010	772,427	238,583	1,778,203
Dairy industry loans	..	..	..	46,125
Linen-flax development	245,997	20	245,977	245,977
Cost and discount, raising loans, &c.	32,911	..	32,911	3,998,827
Closed accounts (for more detail see Table 1)	..	..	..	8,116,740
Totals, General Purposes Account	8,442,379	2,162,252	6,280,127	157,835,31[illegible]§
Electric Supply Account (previously Aid to Water-power Works Account)—				
Construction	1,761,043	57,000	1,704,043	19,211,465‖
Working-expenses	610,721	10,432	600,289	..
Waihou and Ohinemuri Rivers Improvement Account	..	..	..	709,740*d*
Totals, Public Works Fund	10,814,143	2,229,684	8,584,459	177,756,521
EXPENDITURE, OTHER VOTES AND ACCOUNTS.				
Main Highways Account—				
Annual appropriation—	£	£	£	£
Construction, reconstruction, and improvements	1,668,346	140,570	1,527,776*b*	16,969,725*c*
Maintenance, repairs, and renewals	1,429,075	139,305	1,289,770*b*	..
Administration, plant, and miscellaneous expenditure	238,459	65,088	173,371*b*	..
Interest, fees, and loan redemptions	530,365	..	530,365*b*	..
Permanent appropriations (rate subsidies, interest on transfer from Public Works Fund, &c.)	316,826	2,183	314,643*b*	..
Consolidated Fund—				
Maintenance, public buildings, roads, &c.¶	456,290	55,136	401,154	..
Plant, material, and miscellaneous services¶	4,860,098	4,685,555	174,543	..
Closed accounts (for details see Public Works Statement, 1933)	..	..	..	18,955,387
Labour Department (expenditure by Public Works Department): Amounts not included above	13,927	..	13,927	..
Totals, Other votes and accounts	9,513,386	5,087,837	4,425,549	35,925,112
Grand total of expenditure, Public Works Fund and other votes and accounts for the year ended 31st March, 1940	20,327,529	7,317,521	13,010,008	..
Capital expenditure to date	..	..	..	213,681,633

* Includes £4,500 expended under section 16, subsection (1), Native Land Amendment and Native Land Claims Adjustment Act, 1923. † Excludes expenditure on workers' dwellings totalling £319,918 transferred to State Advances Account; includes £154,488 expended under Reserves and other Lands Disposal Act, 1936, section 32. ‡ Includes £4,865 expended under Finance Act, 1932 (No. 2), section 6. § Does not include expenditure under Ellesmere Land Drainage Act, 1905, or £1,226,000 transferred to and included in Main Highways Construction Fund, or £122,500 exchange on remittances beyond the Dominion. ‖ Total capital excluding suspense items as per accounts in Table No. 5. ¶ Excludes transfers to Public Works Fund vote, &c. (£30,000.) *a* Includes previous vote "Settlement of Unemployed Workers." *b* For annual income and expenditure accounts see Appendix E. *c* As per accounts in Appendix E. *d* Excludes interest and loan charges.

Class of Work.	Recoveries, 1940–41.
RECEIPTS,* PUBLIC WORKS DEPARTMENT.	
Ordinary Revenue Account—	£
Irrigation (receipts for year)	27,267
Miscellaneous receipts for year	24,397
Electric Supply Account (sales of energy, miscellaneous receipts, &c.): Receipts for year	1,956,183
Main Highways Account (repayment of advances, &c., and interest): Receipts for year	35,049
Total receipts	2,042,896

* Excludes motor-spirits tax, registration fees, &c., collected by other Departments.

Summary.

—	Public Works Department.	Other Departments.	Total.
	£	£	£
Gross expenditure	16,059,660	4,267,869	20,327,529
Recoveries and receipts	7,998,027	1,362,390	9,360,417

Of the net expenditure of £13,010,008 previously mentioned, £9,299,234 may be regarded as having been expended from loan-moneys (£6,247,216 General Purposes Account, £1,704,043 Electric Supply Account, and £1,347,975 Main Highways Account) the balance — *i.e.*, £3,710,774 — being expended from loan recoveries, revenue, and taxation.

The ratio which the various classes bear to the whole is shown below. It should be noted that the figures are gross—that is, before deducting recoveries, which, if deducted, would detract from the true portrayal of activities.

	£	Per Cent.
Roads, including construction and maintenance of main highways	4,833,631 =	21·61
Hydro-electric (construction and working-expenses)	2,371,764 =	10·60
Railway-construction, improvements, and additions	2,065,110 =	9·23
Public buildings, including schools	1,478,008 =	6·61
Small farms development	828,349 =	3·70
Lands improvement	267,031 =	1·19
Irrigation	672,309 =	3·01
Public buildings, roads, &c. (maintenance)	456,290 =	2·04
Telegraph extension	531,280 =	2·37
Native-land settlement	1,011,010 =	4·52
Plant, material, and services for other Departments	4,860,098 =	21·73
Linen-flax development	245,997 =	1·10
Miscellaneous	706,652 =	3·16
Revenue receipts	2,042,896 =	9·13
	£22,370,425 =	100·00

In regard to the ways and means of the General Purposes Account of the Public Works Fund the position is as under:—

	£	£	£	£
Balance available 1st April, 1940				1,288,991
Add funds received during the year—				
Finance Act, 1939, section 2 (Public Works)		7,979,565		
Less—				
Loans redeemed, 1939–40	1,460,000			
Exchange on remittances beyond the Dominion	122,500			
		1,582,500		
			6,397,065	
Miscellaneous			115,341	
				6,512,406
				7,801,397
Deduct expenditure during 1940–41 under annual appropriations				6,280,127
Balance available 31st March, 1941				£1,521,270

The estimated net expenditure under the General Purposes Account for the current financial year is £5,042,300, and arrangements are being made with the Minister of Finance to provide the necessary funds. This is the amount shown on the Public Works estimates, which also show an estimated net expenditure of £2,957,375 from the Electric Supply Account and £2,742,200 from the Main Highways Account, a total for all these accounts of £10,741,875.

Summary of Votes under Control of Minister of Public Works and Proposed Ways and Means of Raising the Necessary Funds—Year ending 31st March, 1942.

Vote.	Loans.	Consolidated Fund.	Special Revenue.	Total.
	£	£	£	£
Departmental	200,000	..	..	200,000
Railway-construction	607,100	..	..	607,100
Public Buildings	900,000	..	..	900,000
Lighthouses and Harbour-works	50,000	..	..	50,000
Development of Tourist Resorts	20,000	..	..	20,000
Roads	350,000	..	..	350,000
Land Improvement	200,000	..	..	200,000
Irrigation	552,000	..	..	552,000
Electric Supply	1,987,000	..	970,375	2,957,375
Main Highways	642,200	..	2,100,000	2,742,200
Maintenance of Public Works and Services	..	600,000	..	600,000
Totals	5,508,300	600,000	3,070,375	9,178,675

For the current financial year 1941–42 a sum of £600,000 will be provided from the Consolidated Fund for expenditure on maintenance of Public Works and Services, including £100,000 for housing workmen engaged on farm production. The expenditure on main highways (including permanent appropriations estimated at £307,800) is estimated to reach £3,050,000, of which a sum totalling £2,100,000 is expected to be raised by way of special revenue. It is anticipated that the revenue from the supply of electrical energy will reach a sum of £2,288,000, which will be utilized for the payment of arrears of sinking-fund instalments, interest, operating-expenses, and income-tax, &c.

The proposed expenditure from loan-moneys and revenue for votes comprised in the Public Works Fund coming under the control of other Ministers of the Crown is set out hereunder :—

Vote.	Loans.	Consolidated Fund.	Special Revenue.	Total.
	£	£	£	£
Railway Improvements and Additions to Open Lines (Minister of Railways)	150,000	..	1,800,000	1,950,000
Education Buildings (Minister of Education)	500,000	..	..	500,000
Telegraph Extension (Postmaster-General)	275,000	..	..	275,000
Small Farms Development (Minister of Lands)	388,200	..	287,800	676,000
Native Land Settlement (Minister of Native Affairs)	250,000	270,000	425,000	945,000
Linen-flax development (Minister of Industries and Commerce)	600,000	..	369,000	969,000
Total	2,163,200	270,000	2,881,800	5,315,000

MAIN HIGHWAYS.

Having regard to the necessity for curtailing expenditure as far as possible on works that, although they may be desirable under normal conditions, are not essential at the present time, it has been the policy during the last year to taper off all improvement or reconstruction works in hand, so that when they reach a stage where they can be left without endangering the safety of the travelling public, they can be closed down altogether. The programme for the elimination of dangerous railway crossings has been suspended for the present except that particular schemes, which were well advanced, are being carried through to completion.

The activities of the Main Highways Board for the past financial year are described in its annual report, which is attached to this Statement. The report indicates that the total receipts from revenue sources amounted to £2,202,638, as compared with £2,758,808 for the preceding period. The reduced income from motor-spirits tax accounts for £475,208 of the decrease of £556,170, and this reduction is, of course, directly attributable to the petrol restrictions that have operated over the period.

The total expenditure from the Main Highways Account for the financial year ended 31st March, 1941, on actual works, as distinct from loan and special charges, amounted to £2,659,002, which is a very substantial reduction on the preceding year's figures. Maintenance expenditure was reduced by £235,088, the renewal of bridges involved £29,727 less than in the previous year, while the curtailment in constructional activities showed a saving of £1,675,205. The total reduction in main highways expenditure therefore was no less than £1,940,020 as compared with the previous year. In addition, interest and loan charges amounted to £587,747 and general rate subsidies paid to local authorities totalled £213,457. The improvements completed included formation and widening lengths totalling 186 miles and the metalling of various sections aggregating in length 128 miles. The length of dustless surfacing added during the year was 243 miles and the length of new bridging totalled 9,405 lin. ft.

The maintenance of the main-highways system, including the amounts spent by the Main Highways Board and local authorities, represents an average cost per mile of £97·1, compared with £117·6 for the preceding year.

While a decrease in the average maintenance cost per mile has resulted, due to the reduced traffic, the general standard of maintenance has been maintained.

The Highways Board's proposals for the current year provide for adequate and reasonable maintenance of the existing assets, the renewal of decayed or dangerous bridges, and the completion of contracts already in hand, along with the improvement of sections of highway considered necessary by the Army authorities.

HYDRO-ELECTRIC DEVELOPMENT.

All generating stations have operated smoothly during the year, and the financial results of operations have again been very satisfactory. After paying net operating-expenses the revenue for the year gave a return of 9·07 per cent. on the average capital in operation, as compared with 8·7 per cent. for last financial year.

The development of secondary industries made necessary by the war has been a factor in increasing the demand in both Islands, and the units generated in Government generating-stations and Government-controlled stations showed an increase over the previous year of 13·90 per cent. in the North Island and 13·41 per cent. in the South Island.

Amending legislation passed last year rendered the Electric Supply Account liable for payment of taxes, and the sum of £336,049 was accordingly paid for income-tax, national security tax, and social security charge.

Demand versus Generating-capacity.

During the year it has been found necessary to call on all North Island Electric Supply Authorities, which are dependent on the Government hydro-electric generating-stations, to exercise a strict control over the increasing electrical demand in their respective areas. The response so far has enabled the Public Works Department to postpone the implementing of any arbitrary scheme for rationing of supplies, which is the only alternative and one which it is desired to avoid if possible.

Several expedients have been adopted by Supply Authorities in general to tide over the present difficulties, which, however, cannot be disposed of until delivery of additional generating-plant is obtained from overseas; but it is satisfactory to record that up to the present Electric Supply Authorities have not found it necessary to introduce any measures of a drastic nature.

The legislation extending daylight saving throughout the year has proved most beneficial in alleviating the position in the generating-stations.

OPERATING RESULTS.

North Island System.—The plants at Arapuni, Waikaremoana, Mangahao, and Horahora have been fully operated throughout the year. Assistance from various local plants—principally the King's Wharf Station, Auckland, and the Evans Bay Station, Wellington—was necessary during the autumn and winter months to meet the ever-increasing demand for power.

The result of the year's operation was as follows:—

	£
Capital investment at end of year	11,561,705
Revenue	1,533,136
Operating-expenses	640,884
Balance	£892,252

The balance has been used in paying £336,073 for interest, £284,532 for social security charge, national security and income-taxes, and £148,937 to bring the Sinking Fund up to statutory requirements. The balance of £122,710 has been transferred to Reserve Fund. It was not necessary to make any payment to the Depreciation Reserve as this account has reached the statutory limit of 12½ per cent. of capital.

The Reserve Accounts established in connection with this scheme show that £1,112,633 has been credited to Depreciation Reserve, £1,308,951 to Sinking Fund, and £303,948 to the Reserve Fund.

South Island System.—The plants at Lake Coleridge, Waitaki, Monowai, and Arnold River have also been operated successfully.

The year's operations resulted as under:—

	£
Capital investment at end of year	7,289,053
Revenue	678,813
Operating-expenses	173,289
Balance	£505,524

The balance has been used in payment of £254,069 for interest, £51,517 for social security charge, national security and income-taxes, £73,711 to the Depreciation Reserve, and £126,227 to the Sinking Fund.

The various Reserve Accounts established in connection with this scheme show that £813,288 has been paid to the Depreciation Reserve, £543,856 to Sinking Fund, and £86,766 to Reserve Fund. There is still a deficiency of £214,654, as against the statutory requirements of Sinking Fund.

Summarized Position: Percentage earned on Operating Capital after paying Working-expenses.

—	Average Operating-capital.	Gross Revenue.	Working-expenses.	Net Balance.	Percentage Net Balance to Operating-capital.
	£	£	£	£	Per Cent.
North Island system	9,519,865	1,533,136	640,884	892,252	9·37
South Island system	5,882,967	678,813	173,289	505,524	8·59
Totals ..	15,402,832	2,211,949	814,173	1,397,776	9·07

The general position to date is that the Electric Supply Account has been able to meet all operating and interest charges, has provided the statutory requirement of £1,925,921 for depreciation, and in addition, has provided £1,852,807 towards the statutory sinking-fund requirement of £2,067,461. In addition, £390,724 has been paid to the Reserve Fund from profits from time to time. In other words, the electric-supply system as a whole has paid all operating and interest charges and provided £4,169,452 in reserves, of which £1,538,178 has already been utilized for the paying-off of loans which formed part of the original capital. There are, however, still to be met arrears of sinking funds amounting to £214,654.

CONSTRUCTION.

The demand for electric power still continues to increase, and, in addition to the ordinary expansion due to farming development and the construction of houses, industrial development and the supply of military camps has imposed a special load on the supply system.

To meet this demand additional main generating-stations and increased reticulation facilities have to be provided as a matter of urgency.

On the Waikato River two additional 21,600 kW. units are being installed at Arapuni, thus completing the final development at this station to a total of 146,400 kW.

At Karapiro some sixteen miles below Arapuni, a new dam is being built to utilize 100 ft. fall, and three 30,000 kW. generating-units are being installed, thus providing 90,000 kW. additional power from which must be deducted 10,300 kW. at present being generated at Horahora, which will be submerged when this new development is put into operation.

At the outlet to Lake Taupo a diversion canal has been constructed on which six regulating-gates have been installed so that the outflow from Lake Taupo can be regulated to provide water as required for the generating-stations below. The use of these gates will obviate any water being wasted over the spillways at certain seasons, and this water will be stored for use when the peak demand requires it.

At Waikaremoana work is nearing completion on the lower development which utilizes a head of 370 ft., and at this station two 20,000 kW. generating-units are being installed. The main feature of this work is the construction of 7,500 ft. of 16 ft. diameter pressure-tunnel.

At Cobb River good progress is being made on a scheme recently taken over from a private company. This scheme utilizes water under a head of 1,964 ft. and four 3,000 kW. generating-units are being installed, of which one unit is to be used as a spare; therefore the output will be 9,000 kW. This scheme is capable of being doubled at some future date.

In Canterbury construction works are proceeding on Highbank scheme situated on the Rakaia River, although the water-supply is being obtained from the Rangitata River by means of a 42-mile irrigation race. The available fall is 330 ft., and one 25,200 kW. generating-unit is being installed.

At Waitaki two new 15,000 kW. generating-units have been installed, bringing the total capacity of the station to 60,000 kW.

At Lake Tekapo construction has been started on regulating-works which involve the construction of a 20-ft.-diamater concrete-lined pressure-tunnel 6,000 ft. long, and a dam at the outlet of Lake Tekapo. These regulating-works will perform a similar function in controlling the water to Waitaki power-station as the Lake Taupo regulating-works for stations on the Waikato River. In addition to the regulating-works, there is a fall of 100 ft. which will be used subsequently to operate a generating unit of 21,600 kW. capacity at the outlet of the tunnel.

With the exception of Tekapo, tenders for which have not yet been called, the manufacture of the generating-units for these stations is well advanced, and it is hoped that deliveries will be made in due sequence, notwithstanding the prevailing difficulty of shipping during the war period.

RAILWAY-CONSTRUCTION.

Railway-construction is being confined to those railways which at the outbreak of war had reached an advanced stage towards completion, and it is expected that the Dargaville Branch Railway, the Gisborne–Napier Railway, and the Westport–Inangahua Railway can be substantially completed within the current financial year. The position in regard to the works in progress is as follows :—

Dargaville Branch Railway.—The main line is completed and the Public Works Department is operating a useful goods and passenger service.

The formation and platelaying of the station-yards are completed, and a contract for the construction of the station buildings is being arranged.

Gisborne–Napier Railway.—The whole of the formation and tunnelling work is now completed, and the bridges are all completed except for two large reinforced-concrete viaducts over the Waiau River which are now in an advanced state of completion.

Platelaying and ballasting have progressed considerably during the year, and at the end of March the gap between railheads was reduced to 6¼ miles. All the material for the completion of the line is on hand.

Turakina–Okoia Railway Deviation (Wellington – New Plymouth Railway).—The formation and tunnels were completed during the year, and the piers and abutments of the bridges over the Turakina and Wangaehu Rivers are completed in readiness for placing the steel girders. Plans and specifications have been prepared for the station buildings at Wangaehu and Turakina.

South Island Main Trunk Railway.—The construction of this railway has proceeded favourably during the year, and the bulk of the formation, tunnelling, and bridge work is completed. The major work remaining to be done is the laying and ballasting of 40 miles of permanent-way, extensive lengths of coastal-protection work, protection of bridge approaches, and the construction of station buildings.

The position in regard to the supply of rails is still obscure on account of the difficulty of obtaining delivery during the war period, but it is hoped that this difficulty may be overcome in the near future.

Westport–Inangahua Railway.—The formation and bridging work is now completed, and the work remaining to be done is 5 miles 20 chains of platelaying and the completion of 20 miles of ballasting, of which approximately 13 miles has had one lift.

Some small station buildings are required, and these buildings are in hand.

All the material for the completion of the work is on hand.

RAILWAYS: IMPROVEMENTS AND ADDITIONS TO OPEN LINES.

The expenditure out of the Public Works Fund for the year ended 31st March, 1941, was £1,087,337, details being as follows:—

		£
Christchurch new station and yard rearrangement		33,486
Frankton Junction rearrangement		3,153
Wellington new station and yard		6,684
Wellington–Paekakariki electrification		7,544
Oamaru foreshore protection works		20,000
Duplication of lines—	£	
Levin–Koputaroa	4,952	
Papakura–Horotiu	118,889	
Plimmerton–Paekakariki	7,250	
Tawa Flat – Porirua	3,240	
		134,331
Grade and curve easements—		
Picton	9,281	
Glen Eden – Henderson	4,697	
Henderson–Swanson–Waitakere	8,319	
Miscellaneous	3,926	
		26,223
Deviations—		
Palmerston North	34,794	
Scroggy Hill	21,374	
St. Leonard's – Sawyer's Bay	46,485	
Turakina–Okoia	34,027	
		136,680
General—		
Otira Substation		6,698
Purchase of road motor services, plant, and vehicles		81,066
Dwellings		29,416
Elimination of level crossings		15,967
Rail-car depots		5,315
Turntables		14,849
Workshops buildings and plant		29,143
Signalling and communications		19,460
Rearrangements of stations and sidings		87,282
Miscellaneous works		8,661
Additions and improvements to rolling-stock		421,379
		£1,087,337

Little progress has been made in connection with the provision of the new station and yard at Christchurch. The position is that the main portion of the work cannot be proceeded with until the new goods-shed has been completed, and this particular work has been held up pending the delivery of steel from overseas.

The placing of stone at the foreshore-protection works at Oamaru has been completed so far as the present scheme is concerned.

Duplication of Lines.—Earthworks on the Levin–Koputaroa and Tawa Flat – Porirua duplications were completed during the year. Steady progress has been maintained with the duplication between Papakura and Horotiu. The earthwork has been practically completed to Pokeno on the north end and to Te Kauwhata on the south end. A new station building was completed at Pukerua Bay in connection with the Plimmerton–Paekakariki rearrangement scheme.

Grade and Curve Easements.—Steady progress has been maintained with the Henderson–Swanson–Waitakere tunnel grade easements and also on the Glen Eden – Henderson grade easement works. The Para–Tuamarina (Picton) curve easements are nearing completion.

Deviations.—Work on the Palmerston North deviation has been suspended.

Approximately 95 per cent. of the earthworks have been completed on the Scroggy Hill deviation and grade-easement works between New Lynn and Glen Eden. Good progress has been made on the easing of the steep grades between Turakina and Bonny Glen. Only 285 ft. of core excavation remains to be moved from the Sawyer's Bay Tunnel, and the concrete lining is being placed from both ends.

General.—The erection of the new rectifier substation at Otira to replace the existing steam plant is nearing completion. The local substation to supply the townships of Otira and Arthurs Pass has been completed.

A number of passenger and goods road transport service licenses, together with vehicles, plant, and buildings, were purchased during the year. Some of the more important of these services were the New Plymouth Daily Transport, Ltd., Hodgson's Wanganui – New Plymouth Service, Taafe's Awanui–Otiria Service, McGlashan's Greymouth–Blackball Service, the Napier–Wairoa–Gisborne Transport Service, the Rotorua Motor Transport Co.'s service, and the Rotorua Bus Co.'s service.

In addition to alterations and improvements to dwellings, twenty-two new houses were erected and five dwellings were purchased during the year.

The work of improving the railway-operating facilities was continued and larger turntables to accommodate heavier engines were installed. The car-shop at Otahuhu Workshops was extended and workshops plant renewed and improved.

The rearrangement of stations, sidings, and yards and alterations due to grade and curve easements and deviations have necessitated alterations in signalling and communication facilities.

Further additions and improvements were effected in the equipment for signalling and communications.

The following are the more important works shown under the subheadings of "Rearrangements of stations and sidings" and "Miscellaneous works":—

Auckland	Extensions to goods-shed.
Otahuhu and Westfield	Yard alterations.
Rotorua	Yard alterations.
Te Awamutu ..	Improved facilities.
Te Kuiti	Yard alterations.
Taumarunui	Alterations and additions to Locomotive Depot.
New Plymouth ..	Yard and goods-shed.
Feilding	Additional sidings.
Wellington Goods ..	Sealed tracks and roadway.
Napier	Yard and goods-shed.
Gisborne	Station and yard alterations.
Picton Section ..	Yard alterations.
Belfast	Yard rearrangement.

Additions and Improvements to Rolling-stock.—During the year 2 class ED electric and 10 class KA steam locomotives were placed in service.

Ten new boilers were completed.

One new rail car (imported) was placed in service; 25 new carriages and 20 new brake-vans were built.

During the year, 1,236 wagons of various types were built. In addition to the rolling-stock completed during the year, work was in progress on 31st March, 1941, on the construction of a number of engines, cars, vans, and wagons.

ROAD-CONSTRUCTION.

New roading-works undertaken during the year consisted principally of relatively small sections of formation and metalling, together with bridging where necessary, in order to provide access to areas where production would be thereby improved. Apart from such works, construction operations were limited to those projects which were well in hand at the commencement of the year, such as the Awanui–Mangonui, Waiouru–Tokaanu, Taumarunui–Tokaanu, Okau–Tongaporutu, Main South Westland, and Makarora–Haast Roads. The construction of the last-mentioned road has now been suspended.

Progress generally has been governed by the availability of men and materials, the number of workmen employed directly by the Department having decreased at the end of the period by more than one-half of the number employed at the beginning of the year.

Altogether 235 miles of road were formed and 400 miles were metalled by the Department and by local authorities in receipt of grants and subsidies from the Government. In addition, 8,395 lineal feet of bridging was completed, and culverts totalling 32,312 ft. in length were installed.

The net expenditure from the "Roads" vote of the Public Works Fund for the year ended 31st March, 1941, was £599,013, the corresponding figure for the preceding year being £1,124,590.

IRRIGATION AND WATER-SUPPLY.

Steady progress has been maintained on this phase of development work. The completed schemes continue to function well and the area irrigated shows a slight increase on the previous total.

In Otago, thirteen completed schemes are in operation and 52,106 acres were irrigated, out of a total commanded area of 64,000 acres. The annual revenue amounted to £26,730, being £834 in excess of last year's revenue.

In Canterbury, two completed schemes are in operation where 3,350 acres were irrigated, out of a total commanded area of 17,403 acres. The annual revenue amounted to £844, being £157 in excess of last year's revenue. The increase in the use of the Canterbury schemes is below expectation, but this is probably due to reluctance of farmers to prepare their land for irrigation during the war period.

The year's construction activity was confined to the continuation of the large Canterbury schemes which will derive their water-supply from the Rangitata River diversion race.

Work on the Rangitata irrigation and hydro-electric power water-race was continued during the year, and the excavation work is in an advanced state of completion over a length of 40 miles. The total excavation now amounts to 3,220,000 cubic yards, of which 939,000 cubic yards were excavated during the year. The total number of concrete bridges, syphons, and regulating structures now completed on the race is eighty-five, of which fifty-nine were completed during the year. The large intake structure is nearing completion, and the large pressure syphon at Surrey Hills is well in hand. This latter structure is nearly 1¾ miles long, and is made up of precast reinforced-concrete pipes 12 ft. in diameter and 12 ft. long, each pipe weighing 28 tons. These pipes are manufactured in a specially-designed pipe-factory near the site of the works.

The construction of the Ashburton-Lyndhurst Scheme, 34,000 acres, and Mayfield-Hinds Scheme, 54,000 acres, has been continued as circumstances permitted; the former scheme is now 94 per cent. completed and the latter scheme 40 per cent. completed. The construction of these schemes is subservient to the completion of the Rangitata diversion race, and labour and materials have been diverted temporarily to this major work.

The operation of a demonstration area on the Ashburton-Lyndhurst Scheme was continued, and last year the average number of sheep carried per acre was 9·96, while 14·1 sheep per acre were carried during the irrigation season.

The Downlands Water-supply Scheme is now in an advanced state of completion, and 700 farms, comprising a total of 109,000 acres, are now being supplied with water for domestic and stock purposes. Pleasant Point Township is also served with a water-supply and fire service. The length of mains and submains laid is 37 miles, or 70 per cent. of the total, and the length of galvanized reticulation piping laid is 572 miles, or 82 per cent. of the total. Five of the six reservoirs are now completed. It is difficult to forecast when the remaining portion of the scheme will be completed owing to the difficulty of obtaining the remaining piping under present war conditions.

In view of the importance of irrigation and its bearing on closer settlement, it is my endeavour to continue the irrigation-works in progress as actively as the present war conditions will permit.

PUBLIC BUILDINGS.

The expenditure for last year on the various divisions of buildings was :—

	£
General Government buildings	337,769
Courthouses	13,154
Prison buildings and works	2,533
Police-stations	24,343
Post and Telegraph buildings	352,562
Mental Hospitals buildings	126,644
Health and Hospital institutions	44,020
Total	£901,025

NEW DEPARTMENTAL BUILDINGS.

The erection of a number of major departmental buildings which were commenced during the preceding year has been continued, and, under the prevailing conditions, satisfactory progress has been made.

The new premises for the National Commercial Broadcasting Service at Auckland are nearing completion, and work was continued on the building being constructed for the Internal Marketing Division.

The departmental building in Jean Batten Place, Auckland, was approaching completion at the end of the year under review, and several offices will enter into occupation at an early date.

At Wellington good progress has been made with the Stout Street building, the structural concrete work and stone facing have been completed, but a considerable amount of work remains to be done in the way of exterior and interior finishing, including the installation of services and the subdivision of all floors.

A contract has been let for extensions to the Dominion Laboratory, and construction work was commenced recently.

Owing to the fact that essential material has not been available, it has not been practicable to proceed with the foundations of the new Government Printing Office in Wellington.

Extensions to the departmental buildings at Greymouth were completed and the additional accommodation occupied during the year.

AGRICULTURE.

Reasonable progress has been made during the year in providing buildings and other more adequate facilities at the Lincoln and Massey Agricultural Colleges.

Apart from some minor completion aspects at the Ruakura Animal Research Station, the main activity, in continuation of last year's work in progress, was at the Wallaceville Animal Research Station. At both of these research stations the staff are now in occupation of buildings of types which suitably house the extensive range of equipment and other facilities which are so essential to investigation and research relative to animal husbandry and crop and pasture management. The need for extensions of accommodation to facilitate the wine-production activities of the Te Kauwhata Horticultural Station has been long felt. A section of this work which was commenced during the year under review is now nearing completion.

COURTHOUSES.

In last year's Statement a reference was made to a review of all proposals for rebuilding old and out-of-date Courthouses. It has been found that with the difficulties surrounding the supply of materials and skilled labour little material progress has been possible.

It was anticipated that the new Courthouse at Invercargill would have been completed and in use some time ago, but it was found exceedingly difficult to obtain supplies of required materials. The internal fittings are now coming to hand, and it is hoped to be able to arrange for the formal opening within a few months.

The erection of a rebuilt Courthouse at Omakau is well in hand, and a contract has been let for a much-needed new building at Ruatoria. In conjunction with other Departments additions are being erected at Opotiki. Many major proposals were in hand, but these have been deferred in view of the present war situation.

HEALTH AND HOSPITAL INSTITUTIONS.

During the year an additional fifty-eight beds were made available at Queen Mary Hospital, Hanmer, by the completion of the new male block. The boiler-house was also completed, and work on the new laundry and staff cottage is being proceeded with.

In connection with the activities of the St. Helens Hospitals, work on the tennis-court and roadway at the Invercargill hospital has been commenced, and at Wellington properties adjoining the hospital were purchased as a first step towards increasing the facilities available. Extensions to the nurses' cottage at Wellington were also completed.

On the dental side, repairs and alterations were carried out to the hostels for dental trainees in Wellington.

Plans for the new hospital bathhouse and sanatorium at Rotorua were also proceeded with, and this work is being expedited to meet possible requirements in relation to sick and wounded soldiers returning from overseas.

In order to meet the immediate requirements of sick and wounded soldiers, however, special emergency hospitals at Auckland, Wellington, and Christchurch are being provided, and work on these hospitals is now nearing completion. A clearing hospital at Aotea Quay, Wellington has now been completed. The expenditure on this accommodation was met from War Expenses Account.

MENTAL HOSPITALS.

The renewal and extension of essential services, such as water-supply, drainage, telephones, roading, fire-fighting, laundries, kitchens, &c., have been carried out as circumstances demanded.

Accommodation has been provided for occupational-therapy work at several institutions.

Erection of the Nurses' Home at Kingseat has been continued, and a villa for male patients at Tokanui has been completed.

The erection of three male villas at Ngawhatu has continued, and these buildings should be ready for occupation at an early date.

At Templeton a start has been made on the erection of a villa for male patients at Jenkin's Farm; and at Hokitika a new Nurses' Home and butcher's shop are in course of construction.

POLICE-STATIONS.

The police-stations at Rotorua and Port Chalmers were completed, and new stations were erected at St. Heliers Bay, Cheviot, Runanga, and Miramar. New offices have been provided at Levin and Waimate, and lock-ups have been erected at Clyde, Lawrence, and Mokau.

Contracts have been let for a new police-station at Glenavy and for a residence and offices at Temuka, and these works are now in hand.

A site for a police-station was purchased at Glen Eden (Auckland), and residences were acquired for a Sub-Inspector at Northland (Wellington) and for a constable at Lower Hutt.

POSTAL AND TELEGRAPH.

During the year the following buildings were completed: Chief Post-office buildings at Hamilton and Wanganui; post-office buildings at Brown's Bay, Kaukapakapa, Stockton Mine, Taupo, and Waiouru Military Camp; automatic-telephone-exchange buildings at Avondale, Birkenhead, and Gisborne; line, store, and garage buildings at Nelson and Tauranga; garages at Arrowtown, Culverden, Waiau, and Waiuku; and a radio receiving-station building at Awarua. Additions were made to the post-office buildings at Culverden, Dominion Road, Huntly, Matamata, Ngongotaha, Te Mata, Upper Hutt, Waharoa, and Waikaia, and to the automatic-telephone-exchange buildings at Devonport and Onehunga.

Improved accommodation was provided at Blenheim, Point Chevalier, and Port Chalmers.

Several buildings and sites which were no longer required were disposed of during the year. Sites and additional land for departmental purposes were acquired at ten places.

At the end of the year the following buildings were in course of erection: Christchurch (chief post-office); Dunedin (store and workshops); Invercargill (chief post-office); Katikati (post-office and quarters); Lower Hutt (post-office); Mosgiel (post-office and postmaster's residence); Mount Albert (automatic telephone-exchange); Te Kuiti (post-office).

Also in progress were large additions to the chief-post-office building at Auckland, additions to the Ponsonby automatic telephone-exchange, and major alterations to the Auckland (Newmarket) store and workshops buildings, minor additions to the New Lynn post-office building, and alterations to the Timaru chief-post-office building.

PRISONS.

As was the case for the year ended 31st March, 1940, expenditure has again been kept down to a minimum consistent with efficient management, and until the present war is over it is proposed to follow this policy.

At Auckland Prison a proposal was on foot to install an up-to-date mechanical laundry, but, although the major scheme was held over, a hydro-extractor was installed, and this will be of some assistance in the meantime. The electric-lighting equipment for Rangipo Prison Camp has been received, but owing to pressure of military needs it has not so far been found possible to complete the installation. It is hoped to have this much-needed amenity completed during 1941–42.

At Waikeria Borstal Institution a further cottage has been completed, and to relieve staffing difficulties it is proposed to build a further two, as these are really a necessity. Here, also, an up-to-date pasteurizing plant and additional equipment has been installed in one of the dairies to enable the local schools to participate in the Health Department's milk-in-schools scheme.

SCIENTIFIC AND INDUSTRIAL RESEARCH.

At Auckland the wiring of humidity-rooms and the provision of temporary electric supply to the fruit-store were completed for the Plant Diseases Division. The surfacing of the main roads on the experimental area was also undertaken during the year.

A refrigerated gas-stove was erected and equipped at Wellington for use in conducting cool-storage and gas-storage experiments on a semi-commercial scale.

The erection of a cottage for the Grasslands Division at Palmerston North was commenced towards the end of the year.

For the Agronomy Division, Lincoln, building extensions were completed, and a new laboratory and glasshouse were provided at the Wheat Research Institute, Christchurch.

Also at Christchurch, alterations and renovations were undertaken to accommodate the local branch of the Dominion Laboratory, and a building was erected for use as a workshop and store for the Magnetic Observatory.

EDUCATION BUILDINGS.

The gross expenditure on school buildings, additions, teachers' residences, and the purchase of sites amounted to £580,470 during the year ended 31st March, 1941. This sum includes £24,898 provided by the Consolidated Fund to meet the cost of minor works.

The following table shows the capital expenditure on school buildings and sites during the last four years.

	1937–38. £	1938–39. £	1939–40. £	1940–41. £
Public schools	331,558	467,255	583,918	381,547
Education Board offices	..	3,850	15,816	4,100
Secondary schools	58,924	56,819	69,545	72,305
Technical schools	97,740	82,568	60,283	20,218
Training colleges	1,984	27,071	29,325	5,929
Native schools	34,180	39,632	77,666	70,773
University colleges	39,086	58,710	22,456	1,384
Child Welfare institutions	351	..	5,344	21,828
Special schools	312	840	12,683	2,287
School for Deaf, Sumner	4,841	6,295	..	..
N.Z. Institute for the Blind	..	1,000	..	..
Kindergartens	881	1,181	1,734	99
Refund portion purchase-money sale of Education Board Offices	..	1,500	..	..
Gross total	569,857	746,721	878,770	580,470
Less Credits-in-aid	7,913	66,411	7,600	14,436
	£561,994	£680,310	£871,170	£566,034

TELEGRAPH EXTENSION.

The expenditure on telegraph extension by the Post and Telegraph Department during the year in respect of telephone, telegraph, and radio facilities throughout the Dominion amounted to £256,054, as against £416,778 for the year ended the 31st March, 1940.

The establishment of military camps and other defence activities necessitated the provision of improved and additional toll outlets in various parts of the Dominion to meet the demand for toll service. These increased facilities were arranged principally by the establishment of the following carrier-current telephone systems :—

Hamilton – New Plymouth : One single-channel system.
Hamilton–Ohakune : One single-channel system.
Ohakune – Palmerston North : One single-channel system.
Waiouru Military Camp – Hamilton : One single-channel system.
Waiouru Military Camp – Palmerston North : Two single-channel systems.
Wellington–Seddon : One three-channel system.
Christchurch – Hanmer Springs : One single-channel system.
Westport–Greymouth : One single-channel system.

The installation of the additional Wellington–Seddon three-channel system enabled the Department to increase the number of direct telephone channels between Wellington and Christchurch from seven to eight, while the allotment of direct toll outlets between Wellington and Blenheim was increased from three to four. A twelve-channel carrier telephone system is on order to provide for the establishment of twelve additional telephone channels over the Cook Strait coaxial submarine cable to meet expected inter-Island traffic developments in the near future.

Better facilities were also provided between various centres by the erection of new lines and/or the rearrangement of existing circuits.

A four-channel carrier-frequency telegraph system was brought into operation between Christchurch and Greymouth in June, 1940. All the principal West Coast stations now have direct telegraphic outlets to Christchurch.

The demand for telephone-exchange service has shown little diminution during the year, the net gain in subscribers totalling 6,814, as against 7,546 for the previous year. The grand total of telephone stations (main and extension) in the Dominion on the 31st March, 1941, was 228,346, which is 10,477 in excess of the previous year's figure.

The whole of the equipment for the new automatic-telephone exchange at Gisborne, which was ordered in October, 1938, has been received, and the installation work is nearing completion. It is expected that this exchange will be cut over to automatic working in July, 1941.

Practically the whole of the automatic switching-equipment ordered in 1939 for exchanges in the Auckland metropolitan area has been delivered, and a comprehensive programme for the extension of the automatic switching system in that area is being proceeded with as rapidly as possible. The first stage of this programme comprises the installation at the Auckland Central exchange of one thousand lines of equipment specially designed to deal with heavy traffic loads, such as groups of business telephone connections, which were cut into service in April, 1941, in replacement of temporarily arranged equipment; and the replacement of the existing switching apparatus in the Devonport and Onehunga exchanges by modern 7A2 type rotary equipment which will be brought into commission in June, 1941. Additional equipment comprising two hundred individual lines has also been installed at the Mount Eden exchange; and at all main exchanges in the area the old type friction-driven registers have been replaced by 7A2 registers and link circuits.

Additional switching-equipment was also provided during the year at a number of other automatic exchanges throughout the Dominion, and new magneto telephone-exchanges were opened during the year at Parakao and Hanmer Springs.

DEVELOPMENT OF TOURIST RESORTS.

The expenditure for the year ended 31st March last was £21,575, as compared with £24,892 for the previous year.

The expenditure during the year under review included extensions to the Rotorua electric system, additional store-room accommodation and the installation of freezing plant at the Chateau Tongariro, formation of roads and tracks in the Rotorua district and in the Tongariro National Park, also the completion of construction work on the reservoir for the water-supply system at Rotorua.

LANDS-IMPROVEMENT.

Activities under this vote consisted mainly in the continuance of works which were in hand during the preceding year, although a number of miscellaneous improvement works were also undertaken in cases where urgent remedial or protective measures were considered necessary.

Sand-dune reclamation in the North Auckland, Auckland, and Wellington districts was continued, and in the two first-mentioned districts tidal-flat reclamation was undertaken for the purpose of bringing into use what would otherwise remain as waste areas.

Willow-clearing from rivers and streams and drainage of waterways and swamp lands were also features of lands-improvement work carried out during the year.

The water-supply scheme for the Hauraki Plains East district was completed, and a similar undertaking in the Awatere County is approaching completion.

In order to improve flood conditions in the Manawatu River, a contract was arranged for excavating the Whirokino Cut, near Foxton. This new channel is so designed as to conform to any major control scheme which may be adopted in respect of the Manawatu River flooding.

A partial scheme, comprising the clearing of the waterway and the erection of stop-banks, was completed so as to minimize the danger and damage from flooding by the Ashburton and Hinds Rivers, and a recent major flood demonstrated the effectiveness of the works carried out.

A number of river-protection works were completed in the West Coast district of the South Island.

Rehabilitation of Flax-milling Industry.

In pursuance of the policy of the Government in regard to the rehabilitation of the flax-milling industry, considerable work was carried out in and around Foxton. In Foxton itself the Department supervised the erection of the various buildings required by the New Zealand Woolpack and Textiles, Ltd., to house the extra machinery for the expansion of the woolpack industry as a national undertaking. Suitable arrangements were made for the provision of amenities for the welfare of the employees at the factory, which, it was anticipated, will employ over four hundred workers.

Major developmental work was undertaken by the Department in regard to the Moutoa Estate, which was acquired by the Government for development as a flax plantation. The flax is to be used for supplying fibre to the woolpack-factory. The total area of 4,621 acres is being developed over a four-year programme, and a considerable amount of work is being entailed on account of the infestation of the area with willows, fescue, and other noxious growths. Machinery has been used to advantage especially in heavy clearing work, although the nature of the land does not permit of its fullest use. The activities undertaken have included heavy and light clearing, ring-barking willows, ploughing and disking, planting flax, thickening up flax areas where flax was not growing in payable quantities, cultivation of areas of planted flax, drainage, fencing, roading, and the erection of necessary buildings. Up to one hundred and thirty men have been employed on the area, and very valuable work is being done.

Land-clearing.

The scheme initiated by my predecessor in office whereby the Department's heavy machinery was hired to farmers for clearing land of stumps, logs, and second growth has been maintained with satisfactory results.

The cost of bringing such land into cultivation by methods formerly employed was so uneconomic that many areas could only have remained indefinitely as semi-waste land. It is now evident that the use of machinery for stumping, logging, clearing, ploughing, &c., has enabled many hundreds of acres of this land to be brought unto early production at a figure which the farmer has been able to finance without difficulty.

During the year 10,000 acres of land were cleared of stumps and growth, 3,000 acres were ploughed and cultivated, and 70 miles of internal farm roads or tracks were formed under the land-clearing scheme.

TEMPORARY ACCOMMODATION FOR FARM WORKERS AND CHEESE WORKERS.

Last year, when it was desired to increase primary production, arrangements were made to provide farmers with temporary accommodation on their farms for both married and single workers.

The standard of accommodation provided was similar to that used on large public-works construction jobs, and the arrangement was that the temporary accommodation for married men was to be available for the duration of the war, and a season after, at a small weekly rental. In the case of single accommodation this would be purchased outright or rented at a small weekly rental on the same conditions as for married accommodation.

Farmers, particularly in the North Island, very quickly took advantage of this arrangement, and the Department had great difficulty in coping with the orders. Up to 31st March 671 married workers' hutments and 175 single hutments had been erected. Many more have since been completed.

As the requirements in connection with primary produce are now somewhat different from what they were, and as farmers should be able to arrange for any future accommodation under the Rural Housing Scheme, it is not proposed to extend facilities for the provision of temporary accommodation when existing orders are completed.

Temporary accommodation is at present being provided for cheese-factory workers under somewhat similar conditions to those under which farm-workers' accommodation is being provided.

SMALL FARMS DEVELOPMENT.

During the year the Lands and Survey Department, operating through the Small Farms Board, continued with the development and farming of the many areas acquired for settlement under the Small Farms Act, 1932–33, and, in addition, took over a further 19,100 acres. At the 31st March the area under the Board's control totalled 160,610 acres.

The expenditure for the year on improvements (wages and materials), stock, and chattels totalled £572,562, and the credits-in-aid were £258,553.

The good progress made with the development of the older blocks resulted in a change to routine farming and made possible the release without replacement of a considerable number of workmen. At the beginning of the year the number of men employed was 1,101, but this was gradually reduced to 721 at the 31st March.

A decision has been made by the Government to finance soldier settlement from this vote, and the necessary statutory provisions were embodied in the Small Farms Amendment Act, 1940.

SWAMP-LAND DRAINAGE.

In the Hauraki Plains Drainage District 3 miles 17 chains of new drains were constructed, while 27 miles 33 chains of drains and stop-banks were improved. In addition, the usual maintenance work on existing drains and stop-banks was carried out.

In the Rangitaiki Drainage District 56½ chains of new drains were constructed, 7 miles 9 chains of existing drains were improved, and 2 miles of stop-banks were reconstructed. Intensive maintenance of existing drains was carried out.

In the Kaitaia, Waihi, and Poukawa Drainage Areas little new work was carried out, but existing works were maintained.

Full details of the work carried out in the various swamp-land drainage areas will be found in the report of the Chief Drainage Engineer contained in the Lands and Survey Department's annual report.

LIGHTHOUSES AND HARBOUR-WORKS.

Lighthouses.—During the year good progress has been made with the erection of radio-beacon stations and the electrification of lights, notwithstanding difficulties by way of delivery of material from the United Kingdom. At Cape Reinga a new station has been established with electric power and the installation of a radio beacon. The station is now almost complete with three new residences and the necessary buildings for engines, &c. Pending the erection of a new tower which is to house the lantern and lens from the Cape Maria station, a temporary light has been exhibited. Cape Maria station has been discontinued and removed to Cape Reinga. Any equipment and material of use on the mainland station was dismantled and transferred. At Tutukaka Heads a new light has been established but is not yet exhibited. At Cuvier and Moko Hinou Island lighthouses radio beacons and radio telephones have been installed, also the lights electrified. A rearrangement of lights has been carried out at the Hen and Chickens. At Cape Campbell new radio generators were installed and the old set reconditioned to be held as reserve for Baring Head or other beacon stations when required. At Godley Head arrangements are in hand for the reconditioning of the old lens and lantern from Cape Foulwind and erection on a new site. At Centre and Dog Island stations, in conjunction with the Post and Telegraph Department, arrangements are in hand for the installation of radio telephones. At Puysegur Point road access is now almost complete and some progress has been made with the erection of a new power plant to provide electric current for a radio beacon and electrification there. At Jackson's Bay a new tower has been established, but the light is not yet exhibited. At Farewell Spit the erection of a landing-stage has been completed.

Harbour-works.—At Waiheke Island the wharf at Beachlands was demolished and a slipway constructed with the materials salvaged therefrom, and the Orapiu Wharf was reconstructed.

At Westhaven the construction of a breastwork and approach road was commenced.

Repairs and extensions are being undertaken at the Havelock Wharf, and preliminary work has been completed prior to arranging a contract for construction.

Jetties have been constructed at Endeavour Inlet, Ship's Cove, and Tennyson Inlet.

Surveys have been made in respect of a number of projected harbour-works as a preliminary to preparing detailed proposals.

NATIVE-LAND SETTLEMENT.

The gross expenditure from the Public Works Fund for the year under review was £1,010,871 (compared with £1,052,777 for the previous year), the finance for which was provided from the following sources: New loan-moneys, £238,444; grant from the Consolidated Fund, vote "Native," for the promotion of employment of Maoris, £291,669; miscellaneous refunds, £2,663; and farm and other receipts from Native land in course of development and settlement, £478,095.

With the exception of £27,455 expended under the Native Housing Act, 1935, the above figures represent expenditure on the development, settlement, cultivation, and improvement of Native lands, and the progress achieved in regard to these activities is indicated in the following statement, which shows the position at 31st March, 1941:—

Area gazetted for development (acres)	918,000
Area under development (acres)	292,000
Individual settlers established	1,900
Labourers employed	2,900
Houses erected and repaired to date on schemes and under Native Housing Act from vote "Native Land Settlement"	1,855 plus 414 huts.
Live-stock tallies—	
Dairy stock	59,000
Run cattle	27,500
Sheep	251,000
Receipts for year—	
Butterfat (Department's proportion only, 40 per cent.)	£ 169,600
Wool	79,300
Live-stock	200,500
Sundries	28,700

The development and settlement of Native lands, the construction and repair of houses for Maoris, and the promotion of employment amongst the people are measures which are directed by the Board of Native Affairs and controlled by the Native Department. A full report dealing with the operations of the Board, and the policy adopted to encourage and assist the Maori people in their establishment as self-supporting members of the community, is contained in parliamentary report G.-10.

Further detailed particulars of public works carried out during the past year are included in the attached reports by the Engineer-in-Chief, the Government Architect, and the Chief Electrical Engineer.

In accordance with section 24 of the Main Highways Act, 1922, the annual report of the Main Highways Board for the year ended 31st March, 1941, together with a statement of accounts duly audited by the Audit Office, is also attached, *vide* Appendix E.

TABLE No. 1.

SUMMARY SHOWING THE TOTAL EXPENDITURE ON PUBLIC WORKS AND OTHER SERVICES OUT OF PUBLIC WORKS FUND (GENERAL PURPOSES ACCOUNT) TO 31ST MARCH, 1941, AND THE LIABILITIES ON THAT DATE.

Number of Table containing Details.	Works.	Total Net Expenditure to 31st March, 1940.	Expenditure during Twelve Months ended 31st March, 1941.	Recoveries on Account of Services of Previous Years.	Total Net Expenditure to 31st March, 1941.	Liabilities on 31st March, 1941.	Total Net Expenditure and Liabilities.	Works.
		£	£	£	£	£	£	
3	Railways*	68,093,328	1,930,092	462	70,022,958	56,553	70,079,511	Railways.*
..	Roads†	27,521,168	599,013	491	28,119,690	38,015	28,157,705	Roads.†
4	Public buildings‡	17,963,513	1,442,431	1,418	19,404,526	126,008	19,530,534	Public buildings.‡
..	Telegraphs	13,294,682	256,054	..	13,550,736	231,751	13,782,487	Telegraphs.
..	Departmental	3,753,439	49,979	46	3,803,372	6,707	3,810,079	Departmental.
..	Charges and expenses of raising loans ..	3,965,916	32,911	..	3,998,827	..	3,998,827	Charges and expenses of raising loans.
..	Lighthouses, harbour-works, and harbour defences	1,394,498	34,354	..	1,428,852	4,287	1,433,139	Lighthouses, harbour-works, and harbour defences.
..	Irrigation and water-supply§	2,001,542	611,038	18	2,612,562	78,073	2,690,635	Irrigation and water-supply.§
..	Lands improvement‖	1,466,265	242,958	3,635	1,705,588	12,855	1,718,443	Lands improvement.‖
..	Tourist and health resorts	809,708	21,575	..	831,283	258	831,541	Tourist and health resorts.
..	Small-farms development¶	1,865,071	571,215	..	2,436,286	16,737	2,453,023	Small-farms development.¶
..	Swamp land drainage	106,307	3,947	108	110,146	4,471	114,617	Swamp land drainage.
..	Native land settlement	1,579,341	238,583	5,393	1,812,531	29,934	1,842,465	Native land settlement.
..	Linen flax development	..	245,977	..	245,977	22,141	268,118	Linen flax development.
		143,814,778	6,280,127	11,571	150,083,334	627,790	150,711,124	
	Closed accounts :—							Closed accounts :—
..	Immigration	3,312,573	..	88	3,312,485	..	3,312,485	Immigration.
..	Purchase of Native lands	2,054,024	..	..	2,054,024	..	2,054,024	Purchase of Native lands.
..	Defence	1,389,449	..	..	1,389,449	..	1,389,449	Defence.
..	Development of mining	830,855	..	..	830,855	..	830,855	Development of mining.
11 of 1877	Aiding works on Thames goldfields ..	48,859	..	..	48,859	..	48,859	Aiding works on Thames goldfields.
..	Plant, material, and services ..	134,826	..	..	134,826	..	134,826	Plant, material, and services.
..	Interest and sinking fund	218,500	..	..	218,500	..	218,500	Interest and sinking fund.
..	Rates on Native lands	68,672	..	..	68,672	..	68,672	Rates on Native lands.
..	Motor transport services	33,635	..	..	33,635	..	33,635	Motor transport services.
..	Thermal springs	14,600	..	..	14,600	..	14,600	Thermal springs.
10 of 1878	Coal-exploration and mine-development	10,835	..	..	10,835	..	10,835	Coal-exploration and mine-development.
		8,116,828	..	88	8,116,740	..	8,116,740	
..	Transfer to Main Highways Account, Construction Fund	1,226,000	..	..	1,226,000	..	1,226,000	Transfer to Main Highways Account, Construction Fund.
	Totals	153,157,606	6,280,127	11,659	159,426,074	627,790	160,053,864	Totals.

---

* Does not include expenditure on Hutt Railway and Road Improvement, Wellington-Manawatu Purchase, and Railway Improvement Accounts. Includes £150,000 paid to Midland Railway bondholders. † Includes £4,500 expended under section 16 (1), Native Land Amendment and Native Land Claims Adjustment Act, 1923. ‡ Includes £12,500 expended under Finance Act, 1929, Section 32. Includes £154,488 expended under Reserves and other Lands Disposal Act, 1936, section 32. § Includes £115,000 previously expended under Irrigation and Water-supply Account, 1911–12 to 1915–16 and part 1917–18, now included in Public Works Fund; also £6,727 previously expended on irrigation under Lands Improvement now transferred to Irrigation and Water-supply. ‖ £6,727 previously expended on irrigation under this item now transferred to Irrigation and Water-supply; does not include £300,930 expended and included under Roads Class. Includes £46,125 advanced on account of Dairy Industry Loans. ¶ Includes £4,865 expended under Finance Act, 1932 (No. 2), section 6, and expenditure under vote "Settlement of Unemployed Workers" is included.

TABLE No. 2.

GENERAL SUMMARY.

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND (GENERAL PURPOSES ACCOUNT), 1919–20 to 1940–41.

N.B.—The figures in italics, prefixed by "*Cr.*," are either recoveries on account of services of previous years or receipts-in-aid applied in reduction of expenditure.

Description of Services.	Total Net Expenditure to 31st March, 1919.	Expenditure.										
		1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	2,330,113	*Cr. 62,561*	*Cr. 7,806*	247,528	90,611 *Cr. 140*	92,600 *Cr. 1,267*	136,353 *Cr. 16*	107,521 *Cr. 443*	184,918	67,157	50,266 *Cr. 283*	41,756
Public Works, Departmental	1,431,255	121,677	143,280 *Cr. 6,280*	128,002 *Cr. 525*	111,367 *Cr. 131*	110,445 *Cr. 69*	127,556 *Cr. 19*	126,596 *Cr. 129*	115,866 *Cr. 35,948*	130,951 *Cr. 13,328*	142,252 *Cr. 88,499*	132,783 *Cr. 51,671*
Irrigation and Water-supply	176,700	34,115	55,345 *Cr. 9,854*	83,313	58,131	95,467	127,995	56,227 *Cr. 31*	56,937	49,735 *Cr. 2,798*	55,198 *Cr. 8*	69,657
Railways	34,594,661	748,649 *Cr. 105,196*	1,365,466 *Cr. 388*	3,133,200 *Cr. 751*	2,110,859 *Cr. 3,171*	1,776,413 *Cr. 1,167*	1,878,729 *Cr. 37,924*	1,988,614 *Cr. 16,875*	1,480,807 *Cr. 95,647*	1,141,822 *Cr. 1,699*	1,216,277 *Cr. 2,595*	1,812,521 *Cr. 1,296*
Payment to Midland Railway Bondholders	150,000	..	..	..	..	..	..	..	..	..	..	..
Roads :—												
Miscellaneous Roads and Bridges	10,224,320	376,097 *Cr. 603*	527,854 *Cr. 81*	552,895 *Cr. 197*	643,156 *Cr. 244*	751,370 *Cr. 188*	603,968 *Cr. 231*	564,694 *Cr. 4,810*	575,898 *Cr. 981*	669,833 *Cr. 540*	780,990 *Cr. 330*	1,005,330 *Cr. 415*
Roads to give access to Outlying Districts	..	..	..	..	..	..	..	..	..	33,642	51,582	53,693
Roads on Goldfields..	1,079,945	12,465	11,050	11,264	4,850	2,867	2,755	3,934	2,230	2,330 *Cr. 467*	1,005	1,885
Development of Thermal Springs and Natural Scenery ..	16,023	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account*	300,930	..	..	..	..	..	..	..	..	..	..	..
Total, Roads	11,621,218	387,959	538,823	563,962	647,762	754,049	606,492	563,818	577,147	704,798	833,247	1,060,493
Development of Mining	889,014	1,173 *Cr. 7,008*	2,153 *Cr. 1,606*	2,130 *Cr. 51*	*Cr. 98* *Cr. 1,785*	1,363 *Cr. 2,310*	..	..	..	.. *Cr. 1,130*	.. *Cr. 260*	.. *Cr. 260*
Purchase of Native Lands	1,569,926	*Cr. 57*	*Cr. 59*	*Cr. 52*	..	..	..	..	*Cr. 535*	*Cr. 56*	..	..
Native Lands Purchase Account	491,980	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	2,061,906	*Cr. 57*	*Cr. 59*	*Cr. 52*	..	..	..	..	*Cr. 535*	*Cr. 56*	..	..
Telegraph Extension	3,823,597	249,379	336,468	590,981	512,657 *Cr. 11,082*	717,409	957,294	931,661	558,042	625,540	624,414	594,383

* Excludes expenditure subsequent to 1900 included under separate class "Lands Improvement."

[*Continued on page 3.*

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing Net Yearly Expenditure out of Public Works Fund (General Purposes Account), 1919–20 to 1940–41—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1941.
	1930–31.	1931–32.	1932–33.	1933–34.	1934–35.	1935–36.	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.	
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	33,544	5,265 *Cr. 210*	.. *Cr. 583*	.. *Cr. 532*	.. *Cr. 370*	.. *Cr. 362*	.. *Cr. 146*	.. *Cr. 144*	.. *Cr. 108*	.. *Cr. 88*	.. *Cr. 88*	3,312,485
Public Works, Departmental	131,816 *Cr. 16,381*	151,377 *Cr. 33,947*	104,904 *Cr. 52,639*	98,703 *Cr. 33,872*	76,486 *Cr. 31,154*	99,384 *Cr. 28,178*	137,769 *Cr. 17,709*	188,040 *Cr 19,489*	216,091 *Cr. 177*	147,572 *Cr. 2*	49,979 *Cr. 46*	3,793,958
Irrigation and Water-supply*	62,614	37,749	53,290 *Cr. 96*	66,838	91,241	85,414	11,062	71,659	164,481 *Cr. 32*	416,437 *Cr. 21*	611,038 *Cr. 18*	2,577,785
Railways	1,987,196 *Cr. 792*	952,388 *Cr. 20,568*	160,853 *Cr. 9,056*	132,111 *Cr. 20*	125,600	258,011 *Cr. 134,696*	1,019,094 *Cr. 461*	2,412,990 *Cr. 700*	3,798,083	4,165,416 *Cr. 500*	1,930,092 *Cr. 462*	69,755,885
Payment to Midland Railway Bondholders	..	..	..	..	..	..	..	..	..	..	..	150,000
Roads :—												
Miscellaneous Roads and Bridges	1,379,810 *Cr. 472*	1,078,270 *Cr. 564*	396,559 *Cr. 1,171*	359,671 *Cr. 445*	371,573 *Cr. 471*	444,377 *Cr. 250*	913,720 *Cr. 172*	1,126,757 *Cr. 253*	1,290,838 *Cr. 68*	1,124,590 *Cr. 370*	599,013 *Cr. 491*	26,348,236
Roads to give access to Outlying Districts	91,126	3,940	..	..	..	..	..	..	..	..	..	233,983
Roads on Goldfields	4,586	..	..	..	..	..	..	..	..	..	..	1,140,699
Development of Thermal Springs and Natural Scenery	..	..	..	..	..	..	..	..	..	..	..	16,023
Lands Improvement Account	..	..	..	..	..	..	..	..	..	..	..	300,930
Total, Roads	1,475,050	1,081,646	395,388	359,226	371,102	444,127	913,548	1,126,504	1,290,770	1,124,220	598,522	28,039,871
Development of Mining	.. *Cr. 260*	..	.. *Cr. 50*	..	..	.. *Cr. 143*	.. *Cr. 17*	.. *Cr. 1,141*	..	..	..	879,714
Purchase of Native Lands	..	..	..	*Cr. 7,123*	..	..	..	..	..	..	..	1,562,044
Native Lands Purchase Account	..	..	..	..	..	..	..	..	..	..	..	491,980
Total, Land Purchases	..	..	..	*Cr. 7,123*	..	..	..	..	..	..	..	2,054,024
Small Farms Development†	..	..	118,723	172,109	222,309	151,345	92,016	310,665	344,684	446,758	571,215	2,429,824
Telegraph Extension	419,756	249,978 *Cr. 32*	99,999	144,160	135,933	195,380	232,513	312,260	575,944	416,779	256,053	13,549,466

* Includes £6,727 previously included under Lands Improvement class. † Includes expenditure under vote "Settlement of Unemployed Workers."

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing Net Yearly Expenditure out of Public Works Fund (General Purposes Account), 1919–20 to 1940–41—*continued.*

Description of Services.	Total Net Expenditure to 31st March, 1919.	Expenditure.										
		1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
	£	£	£	£	£	£	£	£	£	£	£	£
Public Buildings :—												
General (including Miscellaneous)	423,428	64,207	39,504	87,057	113,553	8,160	30,791 *Cr. 35*	29,369 *Cr. 345*	119,864 *Cr. 429*	42,553 *Cr. 1,065*	4,272 *Cr. 420*	14,106* *Cr. 3,156*
Parliamentary	484,330	..	..	..	..	..	..	..	..	..	35	27,142
Judicial — Courthouses		868	1,400	4,358	2,018 *Cr. 13*	2,448	5,363 *Cr. 19*	7,209	1,261 *Cr. 13*	7,531 ..	8,387 *Cr. 95*	15,765 *Cr. 29*
Judicial — Prisons	978,889	20,981	30,038 *Cr. 800*	41,740	23,113	26,484 *Cr. 2,568*	25,279 *Cr. 86*	24,197	22,812 *Cr. 908*	22,358 *Cr. 524*	12,573 *Cr. 321*	18,814 *Cr. 285*
Judicial — Police-stations		24,944	36,843	22,544	6,298	12,838	18,553	16,594 *Cr. 102*	7,411 *Cr. 13*	5,561 *Cr. 970*	6,925 *Cr. 605*	8,442 *Cr. 319*
Post and Telegraph	1,302,347	66,543	93,364 *Cr. 560*	112,906 *Cr. 675*	77,211 *Cr. 69*	108,395	65,917 *Cr. 210*	89,865 *Cr. 453*	86,052 *Cr. 1,114*	77,194 *Cr. 834*	62,087 *Cr. 1,980*	104,157 *Cr. 197*
Customs	49,441	..	..	..	..	..	..	..	..	..	..	..
Quarantine Stations	6,255	35,490	15,529	4,581	154	171	284	..	..	..	..	..
Mental Hospitals	873,249	18,277	27,368	41,838	13,852	26,541	68,438	77,835 *Cr. 283*	68,635	51,119 *Cr. 3,600*	96,782	152,096
Public Health	32,754	..	..	..	..	..	..	..	..	..	..	..
Health and Hospital Institutions	155,291	8,484	4,099	26,131	20,981 *Cr. 1,399*	7,420	27,951	31,177 *Cr. 300*	15,840	14,361 *Cr. 310*	19,637	16,651
School Buildings	2,667,323	195,500	244,722	2,469 *Cr. 9,255*	.. *Cr. 368*	.. *Cr. 1,090*	.. *Cr. 905*	.. *Cr. 1,050*	.. *Cr. 7,953*	..	.. *Cr. 2,428*	..
Agricultural	64,196	7,227	9,345	1,115	514 *Cr. 27*	282 *Cr. 171*	3,242 *Cr. 686*	7,932 *Cr. 865*	4,164 *Cr. 310*	2,863	2,808 *Cr. 2,395*	2,963 *Cr. 1,721*
Workers' Dwellings	293,244	26,674	..	..	..	..	..	..	..	..	..	..
Total, Public Buildings	7,330,747	469,195	500,852	334,809	255,818	188,910	243,877	280,780	315,299	216,237	205,262	354,429
Lighthouses, Harbour-works, and Harbour-defences :—												
Lighthouses..	207,593	253	758	16,350	3,260	4,473	2,850	5,690 *Cr. 750*	5,758	7,979	2,637	4,460 *Cr. 500*
Harbour-works	394,791	3,245	4,080	2,424	6,524	6,334	423	3,717 *Cr. 131*	13,263 *Cr. 204*	15,891 *Cr. 165*	14,425	10,736
Harbour-defences	546,059	..	..	..	.. *Cr. 1,235*	.. *Cr. 16*	..	..	..	..	..	..
Total, Lighthouses, &c.	1,148,443	3,498	4,838	18,774	8,549	10,791	3,273	8,526	18,817	23,705	17,062	14,696
Rates on Native Lands	68,672	..	..	..	..	..	..	..	..	..	..	..

* Includes £12,500 expended under Finance Act, 1929, section 32.

[*Continued on page 5.*

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing Net Yearly Expenditure out of Public Works Fund (General Purposes Account), 1919–20 to 1940–41—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1941.
	1930–31.	1931–32.	1932–33.	1933–34.	1934–35.	1935–36.	1936–37.	1937–38.	1938–39	1939–40.	1940–41.	
	£	£	£	£	£	£	£	£	£	£	£	£
Public Buildings :—												
General (including Miscellaneous)	85,204 *Cr. 55*	33,189 *Cr. 4,231*	2,107 *Cr. 2,067*	594 *Cr. 1,075*	30,713 *Cr.14,087*	39,447 *Cr.125,964*	57,668 *Cr. 59*	258,978 *Cr. 201*	790,452 *Cr. 1,917*	236,638 *Cr. 42,896*	305,355 *Cr. 295*	2,618,912
Parliamentary	15,723	37	..	..	..	..	27	..	78	3,127	7	530,506
Judicial: Courthouses	19,572 *Cr. 16,403*	3,513 *Cr. 529*	970 *Cr. 222*	72 *Cr. 255*	533 *Cr. 93*	8,701 *Cr. 4,278*	2,655 *Cr. 644*	16,403 *Cr. 200*	34,873 *Cr. 274*	11,436 *Cr. 15*	13,154 *Cr. 22*	1,790,114
Prisons	2,504 *Cr. 134*	2,621 *Cr. 67*	2,026 *Cr. 71*	1,018	1,605	2,123	4.621 *Cr. 20*	9,476	7,656 *Cr. 2,033*	4,348	2,533 *Cr. 25*	
Police-stations	8,360 *Cr. 54*	2,535 *Cr. 91*	1,022 *Cr. 80*	74 *Cr. 79*	2,754 *Cr. 240*	6,710 *Cr. 35*	7,149 *Cr. 172*	11,086 *Cr. 546*	77,745 *Cr. 197*	60,664 *Cr. 581*	24,343 *Cr. 550*	
Post and Telegraph	138,671 *Cr. 1,391*	104,505 *Cr. 3,179*	2,763 *Cr. 4,823*	21,078 *Cr. 1,502*	100,484 *Cr. 582*	232,285 *Cr. 2,760*	158,005 *Cr. 1,436*	248,145 *Cr. 36,844*	280,951 *Cr. 8,166*	362,730 *Cr. 9,208*	352,562 *Cr. 256*	4,171,978
Customs	..	..	..	..	..	..	..	..	..	..	..	49,441
Quarantine Stations	..	..	..	..	..	..	..	..	..	..	..	62,464
Mental Hospitals	134,140	45,938 *Cr. 860*	28,756	73,021	98,629 *Cr. 40*	67,465	142,109 *Cr. 177*	125,829	128,840	175,552 *Cr. 360*	126,644	2,657,633
Public Health	..	..	..	..	..	..	..	..	..	..	..	32,754
Health and Hospital Institutions	17,338	3,316 *Cr. 1*	301 *Cr. 113*	1,248 *Cr. 150*	656	2,191	12,921	15,747	88,099	67,137	44,020	598,724
School Buildings	.. *Cr. 1,110*	259,149 *Cr. 40*	52,623	52,239 *Cr. 805*	51,506 *Cr. 217*	122,357 *Cr. 933*	268,884 *Cr. 2*	546,846 *Cr. 412*	660,666 *Cr. 187*	844,126 *Cr. 1,062*	541,406 *Cr. 270*	6,481,729
Agricultural	1,509 *Cr. 194*	.. *Cr. 1,927*	.. *Cr. 1,535*	48 *Cr. 437*	88 *Cr. 32*	85	60,902† *Cr. 115*	2,269† *Cr. 34*	111,158† *Cr. 557*	37,049	32,407	341,160
Workers' Dwellings*	..	..	..	..	*Cr.319,918*	..	..	..	..	..	..	..
Total, Public Buildings	403,680	443,878	81,657	145,089	*Cr.48,241*	347,394	712,316	1,196,542	2,167,187	1,748,685	1,441,013	19,335,415
Lighthouses, Harbour-works, and Harbour-defences :—												
Lighthouses	4,103	5,046	688	1,276	4,021	3,320	630	8,260	21,638	19,609	30,311	359,713
Harbour-works	6,742	6,987	*Cr. 5,277*	11,988	2,581	*Cr. 399*	669 *Cr. 2*	3,417 *Cr. 200*	12,212 *Cr. 200*	2,910	4,043	520,824
Harbour-defences	..	..	..	..	..	..	..	..	..	..	..	544,808
Total, Lighthouses, &c.	10,845	12,033	*Cr. 4,589*	13,264	6,602	2,921	1,297	11,477	33,650	22,519	34,354	1,425,345
Rates on Native Lands	..	..	..	..	..	..	..	..	..	..	..	68,672

* Transferred to State Advances Account.

† Includes £154,488 expended under Reserves and other Lands Disposal Act, 1936, section 32 (Flock House purchase).

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing Net Yearly Expenditure out of Public Works Fund (General Purposes Account), 1919-20 to 1940-41—*continued.*

Description of Services.	Total Net Expenditure to 31st March, 1919.	Expenditure.										
		1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
	£	£	£	£	£	£	£	£	£	£	£	
Contingent Defence	1,051,578	10,187	8,701	15,586	1,702 *Cr. 463*	4,931 *Cr. 280*	27,133 *Cr. 580*	89,670 *Cr. 33*	34,014 *Cr. 751*	39,986 *Cr. 465*	67,652 *Cr. 648*	46,766 *Cr. 1,325*
Tourist and Health Resorts	261,060	6,194	19,041	17,996 *Cr. 110*	5,435	27,264	12,343 *Cr. 81*	43,486	31,981	36,673 *Cr. 516*	39,254 *Cr. 440*	20,547 *Cr. 1,213*
Lands Improvement*	128,613	2,964	2,064	17,478	26,204	18,182	34,172	70,493 *Cr. 19*	56,267 *Cr. 135*	72,898 *Cr. 2,574*	85,861 *Cr. 87*	79,454 *Cr. 112*
Charges and Expenses of raising Loans	1,253,076	..	184	174,280	62,399	311,905	241,930	297,180	155,373	100,297	438,238 *Cr. 3,811*	518,158
Interest and Sinking Funds	218,500	..	..	..	..	..	..	..	..	..	..	..
Coal-exploration and Mine-development	10,835	..	..	..	..	..	..	..	..	..	..	..
Thermal Springs	14,600	..	..	..	..	..	..	..	..	..	..	..
Plant, Material, and Services	111,613	47,682	169,910	122,801	*Cr. 4,983*	*Cr. 49,159* *Cr. 16*	*Cr. 30,956* *Cr. 1*	36,930 *Cr. 855*	*Cr. 9,334* *Cr. 1,992*	*Cr. 17,610* *Cr. 8,985*	*Cr. 6,551* *Cr. 1,224*	*Cr. 35,092* *Cr. 360*
Motor Transport Service	..	..	..	..	22,679	962	5,000	4,994	..	..	..	..
Transfer to Main Highways Account :— Construction Fund	..	..	..	..	..	..	226,000	..	400,000	200,000	200,000	200,000
Total Ways and Means Credits	..	*112,864*	*19,628*	*11,616*	*20,127*	*9,142*	*40,793*	*27,474*	*146,933*	*40,026*	*106,429*	*62,859*
Grand Total—Net Expenditure	68,676,201	1,907,850	3,121,132	5,449,351	3,892,320	4,056,423	4,558,570	4,588,111	3,841,126	3,360,638	3,870,577	4,854,314†

* Expenditure prior to 1901 (totalling £300,930) included under separate class "Roads."

† Includes £12,500 expended under Finance Act, 1929. section 32.

[*Continued on page 7.*

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing Net Yearly Expenditure out of Public Works Fund (General Purposes Account), 1919–20 to 1940–41—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1941.
	1930–31.	1931–32.	1932–33.	1933–34.	1934–35.	1935–36.	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.	
	£	£	£	£	£	£	£	£	£	£	£	£
Contingent Defence	13,812 *Cr. 586*	.. *Cr. 4,039*	.. *Cr. 624*	.. *Cr. 76*	..	.. *Cr. 704*	.. *Cr. 64*	.. *Cr. 40*	.. *Cr. 11,552*	.. *Cr. 40*	.. ..	1,389,448 ..
Tourist and Health Resorts	60,288 *Cr. 2,494*	87,609 *Cr. 85*	14,454 *Cr. 877*	13,510 *Cr. 21*	12,880 *Cr. 705*	13,683 *Cr. 20*	16,789	23,159	24,552	24,892	21,575	828,103
Lands Improvement*	70,534 *Cr. 1,041*	38,899 *Cr. 506*	38,906 *Cr. 248*	71,825 *Cr. 329*	82,092 *Cr. 722*	37,909 *Cr. 1,006*	62,673 *Cr. 10,366*	147,436 *Cr. 10,699*	134,677 *Cr. 4,415*	172,020 *Cr. 10,980*	86,282 *Cr. 3,635*	1,491,029
Swamp Land Drainage	..	..	14,807	13,959 *Cr. 297*	15,019 *Cr. 231*	12,922 *Cr. 263*	24,965	19,402	5,324 *Cr. 2,598*	2,700 *Cr. 144*	3,947 *Cr. 108*	109,404
Dairy Industry Loans	..	..	..	..	..	10,750	30,510	4,565	300	..	..	46,125
Flaxmilling Industry (Rehabilitation Plan)	..	..	..	..	..	..	..	..	..	505	156,676	157,181
Charges and Expenses of raising Loans	164,535	98,098	15,851	14	600	..	..	..	..	137,609	32,911	3,998,827
Interest and Sinking Funds	..	..	..	..	..	..	..	..	..	..	..	218,500
Coal-exploration and Mine-development	..	..	..	..	..	..	..	..	..	..	..	10,835
Thermal Springs	..	..	..	..	..	..	..	..	..	..	..	14,600
Plant, Material, and Services	*Cr. 42,824* *Cr. 216*	*Cr. 103,571* *Cr. 1,338*	*Cr. 45,463* *Cr. 161*	1,421 *Cr. 22*	*Cr. 10,513* *Cr. 165*	22,438 *Cr. 418*	† *Cr. 1,642*	.. ..	*Cr. 688* ..	*Cr. 3,830*	..	134,826
Native Land Settlement	..	..	..	179,485 *Cr. 52*	125,790 *Cr. 9,662*	71,901 *Cr. 9,491*	112,318 *Cr. 3,423*	254,869 *Cr. 25,018*	493,695 *Cr. 3,387*	357,845 *Cr. 5,249*	238,583 *Cr. 5,393*	1,772,811
Motor Transport Service	..	..	..	..	..	..	..	..	..	..	..	33,635
Transfer to Main Highways Account :—												
Construction Fund	..	..	..	..	..	..	..	..	..	..	..	1,226,000
Linen Flax Development	..	..	..	..	..	..	..	..	..	..	245,977	245,977
Total Ways and Means Credits	*41,583*	*72,214*	*74,416*	*47,092*	*378,689*	*309,501*	*36,630*	*95,921*	*36,556*	*75,346*	*11,659*	..
Grand Total—Net Expenditure	4,769,076	2,994,624	984,446	1,369,370	1,163,891	1,578,298	3,333,039	6,022,337	9,226,481	9,163,103	6,268,467	159,049,745

---

* Expenditure on Irrigation and Water-supply—1905–6, £22; 1906–7, £750; 1907–8, £1,554; 1908–9, £1,966; 1909–10, £2,435, now transferred to Irrigation and Water-supply. † Now provided for under Consolidated Fund.

TABLE No. 3.

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1941.

Lines of Railway.	Mileage opened for Traffic.	Total Expenditure by General Government to 31st March, 1940.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1940–41. New Works.		Total Expenditure by General Government to 31st March, 1941.	Valuation of Works constructed by Provinces and Midland Railway Company.
				Construction and Surveys.	Railways Improvement and Works on Open Lines.		
	M. ch.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£
Kaihu Valley	24 32	179,143 14 9	..	..	..	179,143 14 9	..
Opua Wharf to Whangarei and Onerahi	58 06	622,043 3 9	15 0 0	1 1 0	..	622,029 4 9	..
Otiria to Ngapuhi	13 45	128,457 1 3	..	..	..	128,457 1 3	..
Whangarei Branch (Kioreroa to Waiotira)	19 79	421,747 17 11	..	..	..	421,747 17 11	..
North Auckland Main Trunk—							
Ngapuhi Northwards	11 00	875,548 2 8	..	*Cr.* 3,338 11 8	..	872,209 11 0	..
Helensville Northwards	83 39	3,003,555 16 9	..	..	5,583 17 11	3,009,139 14 8	..
North Auckland Main Trunk to Dargaville	..	539,948 2 10	..	35,826 6 1	..	575,774 8 11	..
Helensville to Te Awamutu	148 67	6,457,521 9 3	..	..	178,735 1 9	6,636,256 11 0	..
Waiuku Branch (Paerata to Waiuku)	12 69	209,359 19 4	..	..	22 18 8	209,382 18 0	..
Huntly to Awaroa	8 75	184,379 5 0	..	..	..	184,379 5 0	..
Waikokowai Branch	..	3,442 0 0	..	..	..	3,442 0 0	..
Frankton to Thames	62 58	529,316 9 5	..	..	4,609 15 5	533,926 4 10	..
Cambridge Branch (Ruakura Junction to Cambridge)	12 02	62,619 6 10	..	..	..	62,619 6 10	..
Morrinsville to Rotorua	69 33	450,197 5 2	..	..	24,174 0 10	474,371 6 0	..
Marton to Te Awamutu	209 69	3,227,954 17 8	..	..	9,510 18 5	3,237,465 16 1	..
Waipa Gravel Access Branch	..	114 0 0	..	..	..	114 0 0	..
Raetihi Branch	8 50	89,452 2 1	..	..	22 8 9	89,474 10 10	
Rotorua to Taupo	..	38,669 2 1	..	309 9 10	..	38,978 11 11	..
Paeroa to Pokeno	..	251,574 16 0	..	10,203 3 11	..	261,777 19 11	..
Paeroa to Tauranga	50 65	1,256,950 14 8	..	..	2,626 4 0	1,259,576 18 8	..
Tauranga to Taneatua, including Te Maunga to Maunganui Branch	59 17	1,499,072 6 10	..	125 5 8	6,995 13 7	1,506,193 6 1	..
Taneatua to Opotiki	..	3,835 9 4	..	1,694 2 2	..	5,529 11 6	..
Gisborne to Motu	49 32	628,126 19 3	..	..	6,055 5 8	634,182 4 11	..
Gisborne to Ormond Tramway	..	4,975 1 7	..	..	..	4,975 1 7	..
Napier to Gisborne—							
Gisborne Southwards	11 51	284,625 13 5	..	..	..	284,625 13 5	..
Waikokopu Northwards	..	2,077,299 17 11	..	312,203 17 4	..	2,389,503 15 3	..
Wairoa Northwards	..	20,681 12 6	..	..	..	20,681 12 6	..
Napier Northwards	38 62	2,645,120 17 2	447 9 2	1,870 0 5	828 8 5	2,647,371 16 10	..
Waikokopu Branch	..	680,067 8 3	..	301 5 4	..	680,368 13 7	..
Wellington to Napier—							
Napier to Woodville and Palmerston North	114 06	1,192,009 18 5	..	..	29,394 12 0	1,221,404 10 5	..
Wellington to Woodville, including Te Aro Extension	129 30	3,398,176 0 11	..	2,715 7 11	7,911 9 0	3,408,802 17 10	..
Featherston to Martinborough	..	399 0 0	..	..	..	399 0 0	..
Wellington to Waitara—							
Wellington to Longburn	83 37	4,619,413 4 3	..	..	42,783 7 4	4,662,196 11 7	..
Foxton to Waitara and Moturoa	196 22	2,688,378 13 7	..	..	83,191 12 6	2,771,570 6 1	..
Mount Egmont Branch	6 00	70,536 1 6	..	..	..	70,536 1 6	..
Moturoa to Opunake	..	3,105 0 0	..	..	..	3,105 0 0	..
Opunake Branch (Te Roti to Opunake)	22 63	447,911 10 10	..	..	*Cr.* 96 9 7	447,815 1 3	..
Manaia Branch (Kapuni to Manaia)	..	9,483 6 0	..	..	..	9,483 6 0	
Rangitikei River Quarry Line	..	206 0 0	..	..	..	206 0 0	..

TABLE No. 3—*continued.*

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1941—*continued.*

Lines of Railway.	Mileage opened for Traffic.	Total Expenditure by General Government to 31st March, 1940.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1940–41: New Works.		Total Expenditure by General Government to 31st March, 1941.	Valuation of Works constructed by Provinces and Midland Railway Company.
				Construction and Surveys.	Railways Improvement and Works on Open Lines.		
	M. ch.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Stratford to Okahukura	89 00	3,123,304 16 7	..	*Cr.* 3 6 0	2,698 1 10	3,125,999 12 5	..
Nelson to Greymouth—							
Nelson to Inangahua	64 47	723,188 3 8	..	*Cr.* 83 1 4	..	723,105 2 4	78,307 0 0
Stillwater to Inangahua	57 32	239,038 8 0	..	..	3,202 12 9	242,241 0 9	279,685 0 0
Ngahere to Blackball	3 40	148,026 2 1	..	..	..	148,026 2 1	..
Westport to Ngakawau	19 56	215,649 11 9	..	..	10,682 12 7	226,332 4 4	..
Ngakawau to Mokihinui	7 12	33 9 6*	..	..	..	33 9 6	..
Mokihinui to Colliery Line	3 69	†	..	..	..	..	..
Westport to Cape Foulwind	7 00	‡	..	..	..	..	..
Westport to Inangahua	5 74	1,119,189 3 7	..	112,446 19 4	..	1,231,636 2 11	..
Greymouth to Rewanui	2 44	265,101 2 9	..	..	2,118 0 0	267,219 2 9	..
Point Elizabeth Branch	8 70	74,363 10 11	..	..	..	74,363 10 11	..
Greymouth to Ross and Mikonui	36 68	445,745 12 3	..	..	2,613 13 7	448,359 5 10	..
Picton to Waipara—							
Picton Southwards	56 06	1,646,566 2 0	..	168,046 14 0	6,330 9 1	1,820,943 5 1	..
Waipara Northwards	44 14	1,554,180 3 8	..	232,482 10 11	..	1,786,662 14 7	..
Christchurch to Greymouth—							
Rolleston to Bealey	73 07	1,021,246 18 0	..	..	9,874 5 0	1,031,121 3 0	61,579 0 0
Whitecliffs Branch	11 38	25,098 13 11	..	..	..	25,098 13 11	..
Greymouth to Bealey	58 12	2,041,933 8 4	..	..	9,108 19 10	2,051,042 8 2	263,889 0 0
Hurunui to Waitaki—							
Main Line (Waiau to Waitaki)	219 07	2,915,753 5 10	..	..	40,203 9 3	2,955,956 15 1	316,135 0 0
Oxford Branch (Rangiora to Oxford West)	21 76	49,697 17 2	..	..	..	49,697 17 2	..
Eyreton Branch (Kaiapoi to Bennett's)	20 07	44,257 0 0	..	..	..	44,257 0 0	..
Lyttelton Branch	6 26	245,344 18 4	..	..	37,527 15 0	282,872 13 4	340,500 0 0
Southbridge Branch (Hornby to Southbridge)	25 31	92,501 0 6	..	..	..	92,501 0 6	..
Little River Branch (Lincoln to Little River)	22 46	112,292 4 6	..	..	..	112,292 4 6	..
Rakaia to Methven	22 20	77,786 11 5	..	..	85 2 7	77,871 14 0	..
Ashburton to Springburn	27 29	64,025 11 3	..	..	..	64,025 11 3	..
Orari to Geraldine	..	321 0 0	..	..	..	321 0 0	..
Fairlie Branch (Washdyke Junction to Fairlie)	36 05	70,502 15 5	..	..	..	70,502 15 5	75,124 0 0
Waimate Branch	12 63	80,862 4 6	..	..	..	80,862 4 6	..
Canterbury Interior Main Line—							
Oxford to Malvern	11 44	46,249 2 9	..	..	..	46,249 2 9	..
Whitecliffs to Rakaia	..	542 0 0	..	..	..	542 0 0	..
Temuka to Rangitata	..	5,152 0 0	..	..	..	5,152 0 0	..
Waitaki to Bluff—							
Main Line, including Port Chalmers Branch	252 71	4,562,673 10 7	..	..	84,553 10 4	4,647,227 0 11	82,259 0 0
Duntroon Branch (Pukeuri to Kurow)	37 33	86,243 8 6	..	..	..	86,243 8 6	37,500 0 0
Ngapara Branch (Waiareka Junction to Ngapara)	14 76	25,511 5 6	..	..	*Cr.* 104 6 6	25,406 19 0	58,009 0 0

---

* The funds for this extension—namely, £35,501 2s. 11d.—were provided by the Westport Harbour Board. † The funds for purchase of this line—namely, £15,745—were provided by the Harbour Board. ‡ The funds for this line—namely, £93,450—were provided by the Westport Harbour Board.

TABLE No. 3—*continued.*

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1941—*continued.*

Lines of Railway.	Mileage opened for Traffic.	Total Expenditure by General Government to 31st March, 1940.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1940–41: New Works.		Total Expenditure by General Government to 31st March, 1941.	Valuation of Works constructed by Provinces and Midland Railway Company.
				Construction and Surveys.	Railways Improvement and Works on Open Lines.		
	M. ch.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Waitaki to Bluff—*continued.*							
Livingstone Branch (Windsor to Tokarahi)	11 75	75,350 15 4	..	..	..	75,350 15 4	..
Waihemo Branch (Palmerston to Dunback)	8 55	32,961 8 11	..	..	..	32,961 8 11	..
Fernhill Railway	1 60	1,330 0 0	..	..	..	1,330 0 0	..
Brighton Road Branch	..	6,474 0 0	..	..	..	6,474 0 0	12,829 0 0
Outram Branch (Mosgiel to Outram)	8 78	12,051 0 7	..	..	..	12,051 0 7	29,691 0 0
Lawrence Branch	58 67	724,592 5 4	..	..	208 6 5	724,800 11 9	..
Balclutha to Tuapeka Mouth	..	2,489 0 0	..	..	..	2,489 0 0	..
Catlin's River Branch (Balclutha to Tahakopa)	42 67	463,709 6 3	..	..	..	463,709 6 3	..
Heriotburn Branch (Waipahi to Edievale)	26 23	124,808 4 5	..	..	..	124,808 4 5	..
Waikaka Branch (McNab to Waikaka)	12 65	68,423 0 0	..	..	..	68,423 0 0	..
Gore to Lumsden	36 39	112,857 18 2	..	..	..	112,857 18 2	..
Edendale to Glenham	9 36	50,430 13 11	..	..	*Cr.* 15 0 0	50,415 13 11	..
Riversdale to Switzers	13 70	82,285 4 0	..	..	..	82,285 4 0	..
Seaward Bush to Catlin's (Appleby to Tokanui)	32 79	185,204 5 5	..	..	1,208 4 4	186,412 9 9	..
Otago Central (Wingatui to Cromwell)	147 27	1,461,937 10 5	..	..	5,027 6 2	1,466,964 16 7	..
Invercargill to Kingston—							
Main Line	87 04	384,400 12 7	..	..	2,519 1 2	386,919 13 9	91,937 0 0
Mararoa Branch (Lumsden to Mossburn)	10 40	27,508 4 4	..	..	..	27,508 4 4	..
Winton to Heddon Bush	..	140 0 0	..	..	..	140 0 0	..
Makarewa to Orepuki and Waiau	56 34	362,764 1 9	..	..	..	362,764 1 9	37,097 0 0
Thornbury to Wairio	22 15	105,171 4 6	..	..	..	105,171 4 6	23,200 0 0
Forest Hill (Winton to Hedgehope)	12 40	23,360 12 3	..	..	..	23,360 12 3	..
Expenses of Railway Commissions and other Expenditure not chargeable to Individual Lines	..	10,337 0 0	..	..	..	10,337 0 0	..
Surveys of New Lines—							
North Island	..	29,229 6 8	..	..	..	29,229 6 8	..
South Island	..	5,942 7 7	..	9 4 6	..	5,951 12 1	..
Rolling-stock	..	15,763,297 4 3	..	..	468,117 17 11	16,231,415 2 2	..
Motor-omnibus Service, Wellington	..	60,571 1 11	..	..	..	60,571 1 11	..
General	..	17,645 1 1	..	*Cr.* 1,155 11 2	..	16,489 9 11	..
Depreciation provided for out of Railway Revenue and actually repaid to Public Works Fund	..	*Cr.* 762,612 9 4	..	..	..	*Cr.* 762,612 9 4	..
Stock of Permanent-way Materials	..	6,432 1 6	..	..	..	6,432 1 6	..
Totals	..	79,366,891 14 3*	462 9 2	873,654 18 3	1,088,309 6 0	81,328,393 9 4*	1,787,741 0 0†

---

* The £10,400,000 accrued depreciation of assets referred to in section 23 (2), Government Railways Amendment Act, 1931, not deducted.

† Includes value for £150,000 paid to debenture holders under the Midland Railway Petitions Settlement Act Amendment Act, 1903.

TABLE No. 4.

EXPENDITURE ON PUBLIC BUILDINGS OUT OF PUBLIC WORKS FUND TO THE 31ST MARCH, 1941, AND THE LIABILITIES ON THAT DATE.

—	Total Expenditure to 31st March, 1940.	Expenditure for Year ended 31st March, 1941.	Total Expenditure to 31st March, 1941.	Liabilities on Authorities, Contracts, &c., to 31st March, 1941.	Total Expenditure and Liabilities.
	£	£	£	£	£
General—					
Alexandra Depot, Wellington*	8,084	..	8,084	..	8,084
Government House, Wellington (land and new building)	77,770	..	77,770	..	77,770
Offices for public Departments†	1,611,212	254,145	1,865,357	33,296	1,898,653
Air Defence	345,040	..	345,040	..	345,040
Miscellaneous	270,468	50,937	321,405	14,181	335,586
Parliament Buildings—					
Old buildings	76,553	..	76,553	..	76,553
New buildings	397,103	7	397,110	..	397,110
Alterations to streets surrounding grounds and purchase of land	57,566	200	57,766	..	57,766
Judicial‡	1,750,680	39,433	1,790,113	3,364	1,793,477
Postal and telegraph‖	3,819,672	352,306	4,171,978	7,262	4,179,240
Customs	49,441	..	49,441	..	49,441
Quarantine-stations	62,464	..	62,464	..	62,464
Mental hospitals	2,530,989	126,644	2,657,633	21,568	2,679,201
Health and hospital institutions§	587,457	44,020	631,477	3,646	635,123
School buildings	5,940,593	541,136	6,481,729	35,829	6,517,558
Agricultural	304,470¶	32,185	336,655	2,609	339,264
Totals	17,889,562	1,441,013	19,330,575	121,755	19,452,330

---

* Expenditure *re* Defence requirements only. Other expenditure included in "Judicial" class.

† Includes £12,500 expended under Finance Act, 1929, section 32

‡ Includes Courthouses, prisons, and police-stations.

‖ Includes £134,485 for land transferred from Railways Department.

§ Includes £32,754 previously shown under "Public Health."

¶ Includes £154,448 expended under Reserves and other Lands Disposal Act, 1936, section 32 (Flock House purchase).

TABLE No. 5.

ELECTRIC SUPPLY ACCOUNT.—STATEMENT OF ACCOUNTS AT THE 31st MARCH, 1941.

General Balance-sheet

at 31st March, 1941, compared with Position at 31st March, 1940.

Liabilities.	1940–41.		1939–40.
	£ s. d.	£ s. d.	*£ s. d.*
Aid to Water-power Works and Electric Supply Accounts—			
Debentures Stock issued—			
At 2½ per cent. interest	1,300,000 0 0		*1,300,000 0 0*
At 3 per cent. interest	3,149,372 9 6		*3,149,372 9 6*
At 3¼ per cent. interest	500,000 0 0		..
At 3½ per cent. interest	1,711,755 0 0		*1,449,225 0 0*
At 3¾ per cent. interest	567,290 0 0		*567,490 0 0*
At 4 per cent. interest	1,643,470 0 0		*1,643,470 0 0*
At 4½ per cent. interest	2,623,913 18 0		*2,623,913 18 0*
At 5 per cent. interest	3,159,227 13 6		*3,159,227 13 6*
Treasury Bills—			
At 1¼ per cent. interest	310,000 0 0		*110,000 0 0*
At 1½ per cent. interest	430,000 0 0		..
At 3 per cent. interest	75,000 0 0		*75,000 0 0*
Treasury Notes—			
At 4½ per cent. interest	..		*93,500 0 0*
		15,470,029 1 0	*14,171,199 1 0*
Consolidated Fund—			
Interest accrued on loans to 31st March, 1941		316,742 19 1	*133,218 9 4*
Temporary transfers from other accounts ..	..	125,000 0 0	*175,000 0 0*
Interest reserve, being excess of interest charged to schemes over interest actually paid on capital liability	..	86,555 18 10	*82,606 13 5*
Carried forward	..	15,998,327 18 11	*14,562,024 3 9*

Assets.	1940–41.		1939–40.
	£ s. d.	£ s. d.	*£ s. d.*
North Island scheme—			
Assets as per separate balance-sheet ..	12,193,876 18 1		*11,039,964 16 8*
Investments, Sinking Fund	25,242 0 9		*2,175 7 5*
		12,219,118 18 10	*11,042,140 4 1*
South Island scheme—			
Assets as per separate balance-sheet ..	7,663,010 7 4		*7,294,627 0 0*
Investments, Sinking Fund	14,222 7 1		*10,547 0 5*
		7,677,232 14 5	*7,305,174 0 5*
Cobb River scheme	..	341,979 1 1	
Surveys and General	..	18,962 16 8	*18,673 4 4*
Carried forward	..	20,257,293 11 0	*18,365,987 8 10*

TABLE No. 5—*continued.*

ELECTRIC SUPPLY ACCOUNT.—STATEMENT OF ACCOUNTS AT THE 31st MARCH, 1941—*continued.*

General Balance-sheet—*continued.*

at 31st March, 1941, as compared with Position at 31st March, 1940—*continued.*

Liabilities.	1940–41.		1939–40.	*Assets.*	1940–41.		1939–40.
	£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.	£ s. d.
Brought forward	..	15,998,327 18 11	*14,562,024 3 9*	Brought forward	..	20,257,293 11 0	*18,365,987 8 10*
Sundry Creditors—				Balance in Electric Supply Account at the end of year—			
North Island scheme	201,053 8 9		*123,739 19 2*				
South Island scheme	72,367 14 5		*46,844 4 9*	Cash in Public Account	39,991 19 4		*50,887 1 2*
Surveys and general	2 1 8		*2 10 0*	Imprests outstanding	146,240 0 0		..
		273,423 4 10				186,231 19 4	
			170,586 13 11				*50,887 1 2*
Depreciation Reserve—							
North Island scheme	1,112,633 2 6		*1,081,075 9 4*				
South Island scheme	813,288 3 3		*755,025 16 10*				
		1,925,921 5 9					
			1,836,101 6 2				
Sinking Fund—							
Amount utilized for redemption of loans	1,538,177 18 3		*1,079,347 18 3*				
Available for further redemptions ..	314,628 14 3		*498,076 19 11*				
		1,852,806 12 6					
			1,577,424 18 2				
Reserve Fund—							
North Island scheme	303,958 4 1		*181,248 2 9*				
South Island scheme	86,765 15 1		*87,199 6 0*				
		390,723 19 2					
			268,447 8 9				
Sundry credit balances—							
North Island scheme	543 14 9		*781 7 2*				
South Island scheme	1,778 14 5		*1,508 12 1*				
		2,322 9 2					
			2,289 19 3				
Total	..	£20,443,525 10 4	*£18,416,874 10 0*	Total	..	£20,443,525 10 4	*£18,416,874 10 0*
Contingent Liability.							
Arrears of appropriation to Sinking Fund ..	214,654 2 3		*252,670 11 5*				

Note.—No charge for cost of exchange on interest payments made in London is included.

J. W. SCOTT, A.R.A.N.Z., Chief Accountant, Public Works Department.

I hereby certify that the General Balance-sheet has been duly compared with the relative books and documents submitted for audit, and correctly states the position as disclosed thereby, subject to the departmental note enfaced thereon.—Cyril G. Collins, Controller and Auditor-General.

TABLE No. 5—*continued.*

NORTH ISLAND HYDRO-ELECTRIC-POWER SUPPLY.

Profit and Loss Account for Year ended 31st March, 1941, compared with Year ended 31st March, 1940.

Gross Revenue Account.

—	1940–41. £ s. d.	1940–41. £ s. d.	*1939–40.* £ s. d.
To Generating-expenses (hydro-electric)—			
Arapuni	28,334 15 1		*31,372 4 7*
Horahora	7,120 3 4		*6,412 12 4*
Mangahao	13,407 11 8		*12,339 16 6*
Tuai	14,996 14 8		*11,599 2 6*
		63,859 4 9	*61,723 15 11*
Generating-expenses (fuel)—			
Penrose	3,392 19 6		*307 1 6*
Waihi Grand Junction	7,828 0 10		..
Huntly	1,159 8 7		*35 10 9*
		12,380 8 11	*342 12 3*
Purchase of power in bulk	..	353,548 19 1	*103,638 13 3*
Standby charges	..	65,688 15 2	*65,304 8 9*
		495,477 7 11	*231,009 10 2*
Transmission system: Patrol and maintenance	..	31,783 16 1	*31,775 14 3**
Substations: Operation and maintenance	..	42,390 9 4	*34,422 10 0*
Communication system: Patrol and maintenance	..	2,295 12 11	..
Distribution: Maintenance	..	2,160 4 7	*2,048 16 4*
System operation, testing, &c.	..	13,820 17 9	*13,827 6 2*
Management and general expenses	..	52,955 14 1	*54,930 17 3*
Balance, to Net Revenue and Appropriation Account	..	892,251 18 10	*960,484 8 3*
		£1,533,136 1 6	*£1,328,499 2 5*

—	1940–41. £ s. d.	1940–41. £ s. d.	1940–41. £ s. d.	*1939–40.* £ s. d.
By Sales of electrical energy—				
Bulk for resale	..	1,457,699 13 0	..	*1,264,605 13 2*
Other than for resale—				
Traction	13,695 4 2			*5,108 15 0*
Industrial	43,228 5 8			*43,919 7 2*
Retail	5,054 1 6			*3,015 9 1*
		61,977 11 4		
			1,519,677 4 4	*1,316,649 4 5*
Rents—				
Land and buildings	..	11,162 2 10		*10,378 4 3*
Lines and plant	..	560 2 4		*571 0 4*
			11,722 5 2	*10,949 4 7*
Miscellaneous revenue	..	..	1,736 12 0	*900 13 5*
			£1,533,136 1 6	*£1,328,499 2 5*

* Includes Communication system: Patrol and Maintenance.

Net Revenue and Appropriation Account.

—	1940–41. £ s. d.	1940–41. £ s. d.	*1939–40.* £ s. d.
To Interest (gross) for year ended 31st March, 1941	377,059 1 10		*364,664 5 7*
Less interest capitalized	40,986 5 6		*19,456 19 3*
		336,072 16 4	*345,207 6 4*
Depreciation on completed works	..	..	*15,476 15 10*
Sinking Fund	..	148,937 2 6	*418,552 3 4*
Reserve Fund	..	122,710 1 4	*181,248 2 9*
Social Security charge, national-security tax, income-tax	..	284,531 18 8	..
		£892,251 18 10	*£960,484 8 3*

—	1940–41. £ s. d.	*1939–40.* £ s. d.
By Balance from Gross Revenue Account	892,251 18 10	*960,484 8 3*
	£892,251 18 10	*£960,484 8 3*

TABLE No. 5—*continued.*

NORTH ISLAND HYDRO-ELECTRIC-POWER SUPPLY—*continued.*

Depreciation Reserve Account.

—	1940–41.	*1939–40.*	—	1940–41.	*1939–40.*
	£ s. d.	*£ s. d.*		£ s. d.	*£ s. d.*
To Replacements, Renewals, &c.	11,685 7 2	*19,051 6 10*	By Balance from previous year's statement	1,081,075 9 4	*1,042,932 14 2*
Balance	1,112,633 2 6	*1,081,075 9 4*	Interest at 4 per cent. per annum	43,243 0 4	*41,717 6 2*
			Amount set aside as per Net Revenue and Appropriation Account	..	*15,476 15 10*
	£1,124,318 9 8	*£1,100,126 16 2*		£1,124,318 9 8	*£1,100,126 16 2*

Sinking Fund Account.

	£ s. d.	*£ s. d.*		£ s. d.	*£ s. d.*
To Balance	1,308,950 16 5	*1,159,820 3 11*	By Balance at close of previous year	1,159,820 3 11	*741,037 17 0*
			Interest	193 10 0	*230 3 7*
			Amount set aside as per Net Revenue and Appropriation Account	148,937 2 6	*418,552 3 4*
	£1,308,950 16 5	*£1,159,820 3 11*		£1,308,950 16 5	*£1,159,820 3 11*

Reserve Fund Account.

	£ s. d.	*£ s. d.*		£ s. d.	*£ s. d.*
To Balance	303,958 4 1	*181,248 2 9*	By Balance at close of previous year	181,248 2 9	..
			Amount set aside as per Net Revenue and Appropriation Account	122,710 1 4	*181,248 2 9*
	£303,958 4 1	*£181,248 2 9*		£303,958 4 1	*£181,248 2 9*

TABLE No. 5—*continued.*

NORTH ISLAND HYDRO-ELECTRIC-POWER SUPPLY—*continued.*

BALANCE-SHEET AT 31ST MARCH, 1941, COMPARED WITH POSITION AT 31ST MARCH, 1940.

—	1940–41.		*1939–40.*
Liabilities.	£ s. d.	£ s. d.	*£ s. d.*
Depreciation Reserve	..	1,112,633 2 6	*1,081,075 9 4*
Sinking Fund—			
Utilized for redemption of loans	1,134,771 13 2		*739,092 13 2*
Available for further redemptions	174,179 3 3	1,308,950 16 5	*420,727 10 9*
			1,159,820 3 11
Reserve Fund	..	303,958 4 1	*181,248 2 9*
Sundry creditors—			
Public Works Department*	25,797 12 6		*32,717 15 11*
Other Government Departments	2,711 3 3		*2,382 12 1*
Non-departmental	172,544 13 0	201,053 8 9	*88,639 11 2*
			123,739 19 2
Sundry credit balances	..	543 14 9	*781 7 2*
Head Office Account	..	9,291,979 12 4	*8,495,475 1 9*
		£12,219,118 18 10	*£11,042,140 4 1*

—	1940–41.		*1939–40.*
Assets.	£ s. d.	£ s. d.	*£ s. d.*
Hydro-electric plants—			
Arapuni	2,645,343 5 9		*2,646,143 19 2*
Horahora	327,381 9 6		*328,466 3 8*
Mangahao	1,365,097 14 5		*1,404,321 18 3*
Waikaremoana	713,523 14 1	5,051,346 3 9	*704,747 8 7*
			5,083,679 9 8
Fuel-plants—			
Penrose	65,431 7 8		*65,431 7 8*
Huntly	11,264 2 5	76,695 10 1	*11,412 1 11*
			76,843 9 7
Transmission-lines system	..	1,747,812 16 6	*1,845,213 3 4**
Substations	..	1,386,362 2 5	*1,209,854 7 10*
Communication system	..	171,634 19 6	..
Distribution system	..	56,664 6 1	*62,342 8 8*
Offices, stores, land, buildings, &c.	..	71,325 7 8	*73,715 3 8*
Cost of raising loans	..	307,478 12 2	*296,955 12 2*
Interest during construction—			
On assets in operation	973,707 15 10		*963,962 2 3*
On assets not in operation	51,120 4 6	1,024,828 0 4	*19,546 18 5*
			983,509 0 8
Works under construction	..	1,667,556 14 11	*797,127 10 7*
		11,561,704 13 5	*10,429,240 6 2*
Plant, motor-vehicles, and tools	..	66,416 13 0	*76,725 4 9*
Stocks of materials	..	245,916 16 10	*224,590 9 6*
Sundry debtors—			
Public Works Department	9,668 19 6		*6,709 10 6*
Other Government Departments	14,077 13 1		*4,735 17 3*
Non-departmental	296,092 2 3	319,838 14 10	*297,963 8 6*
			309,408 16 3
Sinking Fund investments	..	25,242 0 9	*2,175 7 5*
		£12,219,118 18 10	*£11,042,140 4 1*

---

* Includes Communication system.

TABLE No. 5—*continued*.

SOUTH ISLAND HYDRO-ELECTRIC-POWER SUPPLY.

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1941, COMPARED WITH YEAR ENDED 31ST MARCH, 1940.

Gross Revenue Account.

—	1940–41.		*1939–40.*
	£ s. d.	£ s. d.	*£ s. d.*
To Generating-expenses (hydro-electric)—			
Lake Coleridge	14,538 18 1		*12,668 3 5*
Lake Waitaki	8,560 13 1		*8,437 8 6*
Kaimata	1,577 12 9		*1,215 14 10*
Monowai	6,370 10 0		*7,709 0 4*
		31,047 13 11	*30,030 7 1*
Generating-expenses (fuel) Dobson	..	8,421 14 11	*12,816 15 8*
Purchase of power in bulk	..	298 4 3	*337 16 11*
Standby charges	..	225 0 0	..
		39,992 13 1	*43,184 19 8*
Transmission System: Patrol and maintenance	..	24,564 11 7	*15,927 19 10*
Substations: Operation and maintenance ..	..	22,230 8 1	*20,671 17 5*
Communication System: Patrol and maintenance	..	1,373 0 3	*1,353 2 3*
Distribution: Maintenance	..	19,933 18 0	*19,473 12 10*
System operation, testing, &c.	..	11,781 18 1	*7,826 12 1*
Management and general expenses	..	53,411 16 5	*66,521 8 7*
Balance, to Net Revenue and Appropriation Account	..	505,524 9 11	*438,652 12 8*
		£678,812 15 5	*£613,612 5 4*

—	1940–41.			*1939–40.*
	£ s. d.	£ s. d.	£ s. d.	*£ s. d.*
By sales of electrical energy—				
Bulk for resale ..		443,534 13 3		*402,773 19 9*
Other than for resale—				
Traction	21,479 3 9			*21,089 4 11*
Industrial	99,050 2 10			*79,340 15 4*
Retail	101,965 4 2			*96,689 10 4*
		222,494 10 9	666,029 4 0	*599,893 10 4*
Rents—				
Land and buildings ..	..	4,532 15 0		*3,641 11 4*
Lines and plant ..	..	386 6 6		*785 6 0*
			4,919 1 6	*4,426 17 4*
Miscellaneous revenue ..	..	..	7,864 9 11	*9,291 17 8*
			£678,812 15 5	*£613,612 5 4*

Net Revenue and Appropriation Account.

—	1940–41.		*1939–40.*
	£ s. d.	£ s. d.	*£ s. d.*
To Interest (gross) for year ended 31st March, 1941 ..	262,392 19 11		*252,569 17 10*
Less interest capitalized	8,323 8 11		*5,651 0 0*
		254,069 11 0	*246,918 17 10*
Depreciation on completed works	..	73,711 4 7	*124,931 6 1*
Sinking Fund	..	126,227 3 11	*66,802 8 9*
Reserve Fund	..	..	..
Social Security charge, national security tax, income-tax	..	51,516 10 5	..
		£505,524 9 11	*£438,652 12 8*

—	1940–41.	*1939–40.*
	£ s. d.	*£ s. d.*
By Balance from Gross Revenue Account	505,524 9 11	*438,652 12 8*
	£505,524 9 11	*£438,652 12 8*

TABLE No. 5—*continued.*

SOUTH ISLAND HYDRO-ELECTRIC-POWER SUPPLY—*continued.*

Depreciation Reserve Account.

—	1940–41.	*1939–40.*	—	1940–41.	*1939–40.*
	£ s. d.	*£ s. d.*		£ s. d.	*£ s. d.*
To Replacements, Renewals, &c.	45,649 18 10	*33,216 13 8*	By Balance from previous year's statement	755,025 16 10	*637,799 5 1*
Balance	813,288 3 3	*755,025 16 10*	Interest at 4 per cent. per annum	30,201 0 8	*25,511 19 4*
			Amount set aside as per Net Revenue and Appropriation Account	73,711 4 7	*124,931 6 1*
	£858,938 2 1	*£788,242 10 6*		£858,938 2 1	*£788,242 10 6*

Sinking Fund Account.

—	1940–41.	*1939–40.*	—	1940–41.	*1939–40.*
	£ s. d.	*£ s. d.*		£ s. d.	*£ s. d.*
To Balance	543,855 16 1	*417,604 14 3*	By Balance at close of previous year	417,604 14 3	*350,840 10 0*
			Interest	23 17 11	*Dr. 38 4 6*
			Amount set aside as per Net Revenue and Appropriation Account	126,227 3 11	*66,802 8 9*
	£543,855 16 1	*£417,604 14 3*		£543,855 16 1	*£417,604 14 3*

Reserve Fund Account.

—	1940–41.	*1939–40.*	—	1940–41.	*1939–40.*
	£ s. d.	*£ s. d.*		£ s. d.	*£ s. d.*
To Capital loss	433 10 11	..	By Balance at close of previous year	87,199 6 0	*87,199 6 0*
Balance	86,765 15 1	*87,199 6 0*			
	£87,199 6 0	*£87,199 6 0*		£87,199 6 0	*£87,199 6 0*

TABLE No. 5—*continued*.

SOUTH ISLAND HYDRO-ELECTRIC-POWER SUPPLY—*continued*.

BALANCE-SHEET AT 31ST MARCH, 1941, COMPARED WITH POSITION AT 31ST MARCH, 1940.

—	1940-41.		1939-40.
Liabilities.	£ s. d.	£ s. d.	*£ s. d.*
Depreciation Reserve	..	813,288 3 3	*755,025 16 10*
Sinking Fund—			
Utilized for redemption of loans	403,406 5 1		*340,255 5 1*
Available for further redemptions	140,449 11 0		*77,349 9 2*
		543,855 16 1	*417,604 14 3*
Reserve Fund	..	86,765 15 1	*87,199 6 0*
Sundry creditors—			
Public Works Department	19,724 14 0		*13,887 8 4*
Other Government Departments	4,896 15 10		*10,096 0 11*
Non-departmental	47,746 4 7		*22,860 15 6*
		72,367 14 5	*46,844 4 9*
Sundry credit balances	..	1,778 14 5	*1,508 12 1*
Head Office Account	..	6,159,176 11 2	*5,996,991 6 6*
		£7,677,232 14 5	*£7,305,174 0 5*
Contingent Liability.			
Arrears of appropriation to Sinking Fund		£214,654 2 3	*£252,670 11 5*

—	1940-41.		1939-40.
Assets.	£ s. d.	£ s. d.	*£ s. d.*
Hydro-electric plants—			
Lake Coleridge	865,214 15 7		*861,473 14 11*
Lake Waitaki	1,909,802 7 6		*1,775,897 3 3*
Kaimata	146,440 5 4		*143,307 12 11*
Monowai	202,881 9 4		*202,263 2 1*
		3,124,338 17 9	*2,982,941 13 2*
Fuel-plants—			
Dobson	..	133,219 19 2	*133,640 5 0*
Transmission-lines system	..	1,027,863 5 0	*1,005,166 2 3*
Substations	..	721,510 11 10	*652,966 16 4*
Communication system	..	73,017 2 9	*69,378 15 2*
Distribution system	..	872,192 19 1	*851,305 19 7*
Offices, stores, land, buildings, &c.	..	21,670 12 8	*21,518 6 7*
Cost of raising loans	..	532,491 17 6	*529,647 5 2*
Interest during construction—			
On assets in operation	482,274 18 8		*476,533 11 11*
On assets not in operation	7,344 2 2		*4,762 0 0*
		489,619 0 10	*481,295 11 11*
Works under construction	..	293,128 14 8	*209,057 6 9*
		7,289,053 1 3	*6,936,918 1 11*
Plant, motor-vehicles, and tools	..	110,852 3 8	*114,801 16 2*
Stocks of materials	..	126,092 18 5	*121,872 6 8*
Sundry debtors—			
Public Works Department	5,655 10 5		*6,796 9 11*
Other Government Departments	3,866 10 3		*2,591 7 4*
Non-departmental	127,490 3 4		*111,646 18 0*
		137,012 4 0	*121,034 15 3*
Sinking Fund investments	..	14,222 7 1	*10,547 0 5*
		£7,677,232 14 5	*£7,305,174 0 5*

APPENDICES

TO THE

PUBLIC WORKS STATEMENT, 1941.

APPENDIX A.

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS OUT OF THE PUBLIC WORKS FUND FOR THE YEAR 1940–41.

Prepared in compliance with Section 8 of the Public Works Act, 1928.

Public Works Department, Wellington, 25th June, 1941.

SIR,—

In compliance with the 8th section of the Public Works Act, 1928, I enclose a statement of the expenditure during the preceding financial year on all works and services chargeable to the Public Works Fund.

I have, &c.,

H. T. ARMSTRONG,
Minister of Public Works.

The Controller and Auditor-General, Wellington.

STATEMENT OF NET EXPENDITURE ON ALL WORKS AND SERVICES CHARGEABLE TO THE PUBLIC WORKS FUND FOR THE YEAR 1940–41.

Summary.	Appropriation.	Gross Expenditure.			Credits in Aid.			Net Expenditure		
	£	£	s.	d.	£	s.	d.	£	s.	d.
General Purposes Account—										
Public Works, Departmental	190,155	586,290	12	0	537,560	5	3	48,730	6	9
Railways	2,482,050	2,065,109	2	11	135,017	10	10	1,930,091	12	1
Public Buildings	1,772,525	1,478,008	16	5	35,577	10	1	1,442,431	6	4
Lighthouses and Harbour-works	32,320	35,412	19	7	1,058	16	3	34,354	3	4
Development of Tourist Resorts	25,000	23,634	8	7	2,059	7	1	21,575	1	6
Roads, Bridges, and other Public Works	570,000	650,559	14	11	51,546	9	11	599,013	5	0
Telegraph Extension	325,000	531,279	13	7	275,226	2	11	256,053	10	8
Lands, Miscellaneous	350,000	267,030	17	2	24,073	4	5	242,957	12	9
Irrigation, Water-supply, and Drainage	617,500	672,309	11	8	61,271	9	3	611,038	2	5
Swamp Land Drainage	11,000	13,182	4	3	9,235	8	1	3,946	16	2
*Small Farms Development	370,000	572,562	9	0	257,133	16	0	315,428	13	0
Native Land Settlement	350,000	1,010,870	14	10	772,427	1	4	238,443	13	6
Linen-flax Development	430,000	245,997	8	5	20	10	8	245,976	17	9
Unauthorized—										
Services not provided for	..	1,434	0	5	45	19	5	1,388	1	0
Totals, General Purposes Account	7,525,550	8,153,682	13	9	2,162,253	11	6	5,991,429	2	3
Electric Supply Account—										
Development of Water-power	2,850,000	2,371,764	10	2	67,432	11	2	2,304,331	19	0
Unauthorized—										
Services not provided for	..	208	7	3	..			208	7	3
Totals, Public Works Fund	10,375,550	10,525,655	11	2	2,229,686	2	8	8,295,969	8	6

* Includes vote "Settlement of Unemployed Workers" previously shown as separate vote.

APPENDIX A—*continued.*

Name of Vote.	Appropriation.	Gross Expenditure.			Credits in Aid.			Net Expenditure.		
PUBLIC WORKS FUND.	£	£	s.	d.	£	s.	d.	£	s.	d.
General Purposes Account—										
Public Works, Departmental	190,155	586,290	12	0	537,560	5	3	48,730	6	9
Railways—										
Railway-construction	900,000	945,907	12	7	87,975	14	4	857,931	18	3
Railways Improvements and Additions to Open Lines	1,582,050	1,119,201	10	4	47,041	16	6	1,072,159	13	10
Public Buildings	1,072,525	..			..			..		
Subdivision I—Public Buildings, General	..	342,902	8	6	5,133	10	8	337,768	17	10
Subdivision II—Courthouses	..	18,380	8	1	5,226	9	7	13,153	18	6
Subdivision III—Prison Buildings and Works	..	2,580	15	7	47	14	1	2,533	1	6
Subdivision IV—Police-stations	..	31,458	10	1	7,115	9	4	24,343	0	9
Subdivision V—Postal and Telegraph	..	353,483	10	7	921	2	2	352,562	8	5
Subdivision VI—Mental Hospitals	..	127,066	1	9	422	7	3	126,643	14	6
Subdivision VII—Health and Hospital Institutions	..	46,564	14	5	2,544	18	3	44,019	16	2
Education Buildings	700,000	555,572	7	5	14,165	18	9	541,406	8	8
Lighthouses and Harbour-works	32,320	35,412	19	7	1,058	16	3	34,354	3	4
Development of Tourist Resorts	25,000	23,634	8	7	2,059	7	1	21,575	1	6
Roads, Bridges, and other Public Works	570,000	650,559	14	11	51,546	9	11	599,013	5	0
Telegraph Extension	325,000	531,279	13	7	275,226	2	11	256,053	10	8
Lands, Miscellaneous	350,000	267,030	17	2	24,073	4	5	242,957	12	9
Irrigation, Water-supply, and Drainage	617,500	672,309	11	8	61,271	9	3	611,038	2	5
Swamp Land Drainage	11,000	13,182	4	3	9,235	8	1	3,946	16	2
Small Farms Development	370,000	572,562	9	0	257,133	16	0	315,428	13	0
Native Land Settlement	350,000	1,010,870	14	10	772,427	1	4	238,443	13	6
Linen-flax Development	430,000	245,997	8	5	20	10	8	245,976	17	9
Unauthorized—										
Services not provided for	..	1,434	0	5	45	19	5	1,388	1	0
Totals, General Purposes Account	7,525,550	8,153,682	13	9	2,162,253	11	6	5,991,429	2	3
Electric Supply Account—										
Development of Water-power	2,850,000	2,371,764	10	2	67,432	11	2	2,304,331	19	0
Unauthorized—										
Services not provided for	..	208	7	3	..			208	7	3
Totals, Public Works Fund	10,375,550	10,525,655	11	2	2,229,686	2	8	8,295,969	8	6

NOTE.—This statement includes only the expenditure on works, and does not include expenditure such as interest, sinking funds, and charges and expenses of loans.

J. W. SCOTT, A.R.A.N.Z.,
Chief Accountant.

W. L. NEWNHAM,
Engineer-in-Chief and Under-Secretary.

The expenditure charged to the Public Works Fund has been examined and found correct subject to the remark that, as the Appropriation Act, 1940, made no provision for subdivisions in vote, "Public Buildings," the allocation of expenditure to the several subdivisions of that vote has not been checked.—CYRIL G. COLLINS, Controller and Auditor-General.

APPENDIX B.

ANNUAL REPORT ON PUBLIC WORKS BY THE ENGINEER-IN-CHIEF.

The ENGINEER-IN-CHIEF to the Hon. the MINISTER OF PUBLIC WORKS.

SIR,—

I have the honour to submit the following report upon the various works completed and in progress throughout the Dominion during the financial year ended 31st March, 1941.

RAILWAYS.

DARGAVILLE BRANCH RAILWAY.

The progress of this work has been retarded by war conditions.

Kirikopuni–Tangowahine Section (0 m. to 10 m. 17 ch.).—The work on this section was confined to maintenance, and proposals have now been approved for the lifting of the Kirikopuni Loop and the construction of a new station-yard at the commencement of the loop.

Tangowahine–Dargaville Section (10 m. 17 ch. to 19 m. 70 ch.).—The works completed during the year were as follows: Earthwork, 35,000 cubic yards; culverts constructed, 250 lineal feet; Tangowahine River Bridge (10 m. 20 ch.) lengthened by one 30 ft. plate-girder span; overbridge at 17 m. 51 ch. completed; overbridge at 13 m. 53 ch. in hand; platelaying, 1 m. 40 ch.; ballasting, 12,300 cubic yards, this completing the platelaying and ballasting of the main line.

Te Wharau Station Yard (15 m.).—This station was completed with the exception of ballasting of the sidings and metalling of the access road.

Dargaville Station Yard.—Formation work and platelaying were completed and the first lift of ballast laid. An approach road 43 chains long was completed and the base-course metal laid.

The platform 600 ft. long was completed, and arrangements are in hand for letting a contract for the station buildings.

A regular goods service was maintained over this branch during the year and has been of great value to the district.

PAEROA–POKENO RAILWAY.

Construction work on this railway was suspended in May, 1940.

The total work completed up to the date of suspension comprised: formation, 774,000 cubic yards; fencing, 19 m. 56 ch.; and culverting, 4,439 lineal feet.

The plant and stores have been transferred to other works, and most of the accommodation has been made available to farm workers.

A small maintenance-gang has been employed to keep the completed formation in order.

NAPIER–GISBORNE RAILWAY.

Kopuawhara Section (length, 11 m. 60 ch.).—A total length of 455 chains of permanent fencing was erected during the year. Two pairs of cattle-stops were constructed at road crossings.

Excavation totalling 39,850 cubic yards was carried out, and all earthwork was completed to 30 m. 15 ch. Work is in hand clearing out cuttings and widening banks to 33 m. 33 ch. The total excavation carried out on this section to 31st March, 1941, was 836,250 cubic yards.

Trimming preparatory to platelaying was completed to 30 m. 5 ch. A retaining-wall at 28 m. 64 ch., 66 ft. long, was completed. Wire-mesh and boulder groynes have been placed in the Kopuawhara Stream at 30 m. 45 ch., 31 m. 12 ch., and 32 m. 11 ch., a total of 860 cubic yards being constructed. Concrete-pipe culverts of the following sizes and lengths have been constructed: 12 in. diameter, 16 ft.; 24 in. diameter, 32 ft.; 30 in. diameter, 32 ft.

At the Waiau Stream Bridge at 30 m. 15 ch. the construction of eight 40 ft. spans and one 30 ft. span has been completed, leaving only the central arch span of 180 ft. The steel falsework for this span has been placed in position, and timber work was completed to the stage of laying sheathing for the soffit of the arch rib.

On the Waiau Stream Bridge at 32 m. 1 ch. all the foundations for the piers were completed with the exception of abutment K. Abutment A and piers B, C, D, E, F, G, and H were completed to full height, and piers I and J are in course of construction. Falsework for spans AB, BC, and CD was completed, and boxing steel placings were well advanced.

The Waiau Stream Bridge at 33 m. 27 ch. is to be a reinforced-concrete bridge of four 40 ft. spans. Excavation for foundations for piers C and D has been completed and some concrete has been placed. The Waiau Stream Bridge at 33 m. 33 ch. comprises three 40 ft. plate girder through spans on concrete piers founded on 10 in. by 8 in. R.S.J. piles driven to solid sandstone. During the year the concreting of all piers was carried out and girders placed, but not riveted owing to shortage of labour. In March a riveting gang started and completed one and a half spans.

All bridge-construction has been adversely affected by the shortage of skilled labour.

Tunnelling on this section comprises five short tunnels aggregating 1,511 ft., as well as the southern face of the Waiau–Tikiwhata Tunnel. Four short tunnels are complete—viz., at 30 m. 09·45 ch. (156 ft. of excavation and lining), 30 m. 52·16 ch. (385 ft. excavation and lining), 31 m. 40·22 ch. (356 ft. excavation and 359 ft. lining), and at 33 m. 06·77 ch. (397 ft. excavation and 411 ft. of lining).

The tunnel at 32 m. 05·77 ch. will have a total length of 200 ft., of which 117 ft. of excavation and 99 ft. of lining have been completed.

In the Waiau–Tikiwhata Tunnel, which will be 9,804 ft. in length, driving of the south face has been somewhat retarded due to wet ground and shortage of man-power. During the year 1,275 ft. have been excavated and 1,401 ft. lined. The total progress to date is south-end excavation, 4,590 ft. and lining 4,253 ft., while on the north end 4,901 ft. have been excavated and lined, making a total of 9,491 ft. and 9,154 ft. respectively.

At 31st March, 1941, the headings of the tunnel-faces were separated by 218 ft.

Platelaying is completed to 29 m. 70 ch., an advance of 4,525 lineal yards. The three lifts of ballast were completed to 28 m. 38 ch. The men employed on both ballasting and platelaying were transferred to urgent work in another district in January, and since then no advance has been made.

In the Waikokopu Station yard at 22 m. 70 ch. a 6,000-gallon water-vat was completed, together with the necessary supply-lines. Also a loading-bank, shelter shed, and latrines were constructed, and the formation of access roads carried out.

At the Opoutama Station yard at 25 m. 70 ch. large stock-yards, a loading-bank, buffer-stops, and the towers for two 12,000-gallon vats were constructed.

The maintenance of all service roads has been carried out. Early in the year four large bins served by a temporary service line at 28 m. 35 ch. were constructed, and all concrete aggregates and road-metal are drawn from this storage.

Wharerata Section (length, 9 m. 17·65 ch.).—Progress on this section has been steady, but tunnelling at the north end of the Waiau–Tikiwhata Tunnel was somewhat retarded due to heavy wet ground being encountered.

The earthwork has been completed except for a large slip of about 7,000 cubic yards at 18 m. 62 ch. and minor slips along the section. Culverts and water drives are complete except for extension and improvements to outlets made necessary by washouts along the steep coastal length.

The total length of bridging on this section has been increased from 875 ft. to 1,080 ft. by the substitution of bridges for retaining-walls. The total length completed is 695 ft.

The tunnelling operations on this section have been completed with a total length of 14,091 lineal feet, made up as follows: Waikoura Tunnel, 4,730 ft.; Tunnel at 20 m. 15 ch., 486 ft.; Coast Tunnel, 3,074 ft.; Tunnels at 35 m. 40 ch., 35 m. 46 ch., and 35 m. 58 ch., 980 ft.; Waiau–Tikiwhata (north end), 4,901 ft.

The platelaying has been completed into the Tikiwhata Valley, 22 m. 11 ch. from Gisborne, the length of main line laid during the year being 8 m. 42 ch. Permanent-way has also been laid on the main and goods-shed sidings in the Wharerata Station yard and the 20 ch. coast siding was completed.

First-lift ballasting has been completed from 14 m. to 16 m. 26 ch., and a second lift from 14 m. to 14 m. 32 ch. This work has been retarded by a shortage of experienced lifters. There remains about 31,000 cubic yards of ballast to be placed in position to complete.

The erection of the permanent telephone-line is complete to 17 m. 51 ch.

Gisborne Section (length, 14 m. 0·735 ch.).—Progress on this section was mostly confined to platelaying, ballasting, lifting, and bridging. All this work is well in hand, but progress was retarded on account of the late arrival of bridge girders and the shortage of experienced labour for lifting and ballasting.

Platelaying on the main line has been completed, and a large proportion of the Matawhero Station yard has also been done. First and second lifts of ballast have been completed for the main line over the whole section, 11,300 cubic yards of ballast having been placed during the year. Ballasting of the Muriwai Station yard has been completed, and similar work for the Matawhero yard is in hand.

The bridges over the whole section have been completed except for repainting and the substitution of permanent girders for temporary 20 ft. wooden spans. The substitution of the steel girders when they arrive and the completion of the four spans affected represents only two weeks' work.

The fencing of the section has been completed.

At Muriwai Station yard the platform and loading-banks have been completed, and tenders are being called for the erection of station buildings and additional platelayers' cottages there, and for platelayers' cottages at Matawhero.

The telephone-line has been completed.

At the Waipaoa River the construction of ten pervious pile and sheathing groynes has been completed to combat further erosion of the river-bank at the sharp bend up-stream from the railway-bridge. Rock facing and the planting of bamboo on the batters has yet to be done to complete the work.

TURAKINA–OKOIA RAILWAY DEVIATION.

The approaches to the Wangaehu and Turakina Bridges and the completion of a short section at the north end of the Turakina Tunnel comprised the only earthwork carried out during the year.

The excavation of the Turakina Tunnel was completed, together with the lining of the length of 499 ft. which remained unfinished at the close of the previous period.

Flooding interrupted the construction of bridging over the Wangaehu and Turakina Rivers, but in both cases the foundations were practically completed in readiness for the placing of the steel girders.

Practically the whole of the trimming has been finished, while further permanent fencing, with private crossing-gates, was completed over a length of 109 ch.

Plans and specifications were prepared for various buildings at the Wangaehu and Turakina Stations.

A large number of buildings which had been used for accommodating married employees were transferred and re-erected for temporary accommodation on farms.

PALMERSTON NORTH RAILWAY DEVIATION.

There have been 102,745 cubic yards excavated during the year, and this spoil has been tipped at the following places: Main goods-yard filling, 30,208 cubic yards; passenger yards, 16,000 cubic yards; Gillespie's Line ramp, 16,338 cubic yards; Longburn ramp, 2,045 cubic yards; and City Council recreation area, 38,154 cubic yards.

The Kawau Stream culvert, which is 781 ft. long and 18 ft. wide, has been completed. During the year 268 ft. were added and 3,200 cubic yards of spoil excavated from the foundations.

At Gillespie's Line Overbridge 16,338 cubic yards were deposited on the ramp, and all pile driving completed.

Two test piles, each 31 ft. 9 in. long by 16 in. square, were driven at the Longburn–Rongotea Overbridge. At Setter's Line Overbridge four test piles were driven.

The following concrete-pipe culverts were placed: 557 ft. of 3 ft. 6 in. diameter, 102 ft. of 12 in., and 142 ft. of 6 in.

On an area of about 12 acres situated on the corner of Boundary Road and Rangitikei Line 38,154 cubic yards of spoil were dumped. This is to be a recreation area under the control of the Palmerston North City Council.

Two complete private crossings with two extra gates were erected at 86 m. 40 ch., 120 ch. of fencing were erected and strained up, and several side drains were cleaned out and 40 ch. of new drain cut at Longburn.

Six chains of access roads have been formed and metalled for various settlers along the line.

On the Whakarongo Section a dam 60 ft. by 30 ft. by 8 ft. has been excavated at 0·50 ch. to supply water to stock.

Six railway-gates have been erected.

Work on this deviation has now been suspended.

SOUTH ISLAND MAIN TRUNK RAILWAY.

As construction had advanced sufficiently from the north and south ends it was decided to centralize the works headquarters, and from the 1st April, 1940, activities were directed from Kaikoura. Consequent upon the enlistment of staff and workmen for military service, the number of men employed on this railway decreased, and at the close of the year under review amounted to only a little more than one-half of the number employed at the beginning of the year.

Non-delivery of rails and of reinforcing steel for bridge-construction also contributed to a reduction in the rate of progress.

Clarence Section.—Work on this section is nearing completion, and stock trains are now running southwards to the Clarence Bridge.

The excavation at the Blue Slip has been completed, and although some movement is still taking place the country is standing reasonably well. The road deviation has been completed and the track has been laid past the slip.

Work is in progress on the erection of station buildings, including platelayers' cottages at Kekerangu, Clarence Bridge, and Parikawa, and water-supplies for locomotive and domestic requirements are being installed at the two first-mentioned places.

All platelaying has been completed and the track on this section is being cleared up and the final lift of ballast ploughed out.

Kaikoura Section.—The erection of the steelwork of the Clarence River Bridge (1,524 ft.) was completed with the exception of painting. The contractor also completed the bridge over the Hapuku River (1,541 ft.). Severe flooding in March carried away the protection and north abutment of the Clarence Bridge and damaged the approach banks of the Hapuku Bridge. Heavy slipping on the formation also occurred as a result of the severe rainfall necessitating the removal of 17,000 cubic yards of material.

All bridges north of Kaikoura, with the exception of Middle Creek, have been completed.

Proposals are in hand for bridging south of Kaikoura.

Culvert work is substantially complete and sea protection is well advanced.

Although sleepers and track fittings are on hand, rails are not yet available, and for this reason no platelaying or ballasting has been carried out on this section.

The erection of a number of permanent cottages at Kaikoura is in progress, and arrangements are being made to call tenders for the remaining cottages and station buildings at this location.

The permanent telephone-line has been completed to 104 m. 54 ch., and 6 m. 54 ch. were erected during the year.

Fencing over a length of 3 m. 73 ch. was completed, but this work has been delayed through shortage of material.

Oaro Section.—Formation work is well advanced throughout the uncompleted length between 61 m. 40 ch. and 73 m. 30 ch., but recent heavy slipping will involve an increase in the quantity of material to be handled.

The Amuri Bluff Tunnel was completed. The remaining tunnel-work comprises the finishing of the tunnel at 64 m. 48 ch., the excavation of which is approaching completion and an additional tunnel of 7 ch. length at 69 m. 65 ch. which is being driven to avoid a deep cutting in unfavourable ground.

The total length of tunnelling completed during the year was 3,139 lineal feet.

The erection of the Okarahia Stream Bridge was continued, the Oaro River Bridge was approximately 50 per cent. completed, and pile-driving for the Kahautara Stream Bridge was commenced.

Culvert work, although well advanced and ahead of formation requirements, has been retarded owing to shortage of labour. Sea protection has been continued.

The erection of the permanent telephone-line and fencing has been continued as far as circumstances allowed.

Platelaying has been carried on as far as practicable, 2 m. 7 ch. having been completed during the year. Also 1 m. 41 ch. of trimming, 2 m. 4 ch. of ballast first lift, 2 m. 38 ch. of second lift, and 1 m. 63 ch. of third lift were completed.

The Claverley Station yard has been ballasted and sidings laid. Station buildings and cottages have also been erected at this station.

Conway Section.—Construction on this section has been completed and stock trains are being operated as far as Claverley.

During the year permanent cottages were completed at Ferniehurst Station and permanent station buildings and cottages were erected at Hundalee.

Westport–Inangahua Railway.

Cascade Section.—Maintenance-work has been continued throughout the year. The four steel bridges are carrying temporary track sleepers, but permanent sleepering is coming to hand in readiness for changing over when full supplies are available. In addition to transporting men daily, the works train operated by the Department carried 19,184 tons of coal from the Cascade-Westport Coal Co.'s bin at Cascade Creek to Westport, and also a substantial quantity of ballast material for the Railways Department.

Cascade – Inangahua Junction Section.—Formation has been almost completed, the major works yet to be done comprising 10,000 cubic yards on one filling, the battering of steep faces, the removal of slips, and trimming and grading.

A reinforced-concrete bridge, 260 ft. in length, has been erected at Slaty Creek. The construction of the R.S.J. bridge at Tracy Creek has been well advanced, and of the three 100 ft. steel-girder spans for the Orikaka River bridge two spans have been placed in position.

A small amount of culverting remains to be installed on this section.

Platelaying was completed by the contractor over a length of 13 m. 12 ch. and the remaining length of 5 m. 21 ch. will be laid by the Department.

First-lift ballast has been placed and packed from Cascade Bridge to 15 m. On the Inangahua end first-lift ballast has been spread from 21 m. 62 ch. (Westport chainage) to the Buller River Bridge at 60 m. 27 ch. (Stillwater chainage).

Fencing has been completed on the Inangahua end to 60 m. 70 ch. on the right and to 60 m. 63 ch. on the left, the rate of progress being governed by the availability of fencing-wire.

A commencement has been made with the erection of the permanent telephone and signal line.

The station buildings at Te Kuha, which have been used for storing materials, are being renovated. Additional water-storage has been provided at Tiroroa.

The rainfall at Tiroroa for the year ended 31st December, 1940, was approximately the same as that recorded for the preceding year, 155·44 in. having fallen over 176 days.

IRRIGATION.

CENTRAL OTAGO.

Weather conditions in Central Otago varied considerably during the past season. The lack of snow on the high country was counterbalanced by good rains in the spring and early summer, but very dry conditions obtained from January onward. Water-supplies ran very low in the Tarras and Hawkdun Schemes towards the latter end of the season, but ample storage in dams enabled the other schemes to receive a good supply.

The only construction work undertaken was the provision of a new intake and measuring-device from the Manuherikia River near Blackstone Hill. This race supplies six irrigators and commands 1,100 acres, and is part of the Omakau Scheme.

Maintenance-work was heavier than usual due to flood damage, and it was necessary to replace 714 ft. of riveted steel pipe with 370 ft. of concrete flume and 344 ft. of 30 in. diameter reinforced-concrete pipe on the Teviot Scheme, and further extensive damage was sustained on the Omakau, Hawkdun, and Arrow River Schemes.

The number of irrigators shows an increase of thirteen and the irrigated area was increased by 811 acres.

The following table gives details of the completed schemes in operation, also the area which should have been irrigated had all rates been forthcoming :—

Scheme.	Area actually irrigated.	Area that should have been irrigated.	Number of Irrigators actually supplied.
	Acres.	Acres.	
Arrow River	2,605	2,980	47
Ardgour	1,364	1,364	11
Bengerburn	64	94	13
Earnscleugh	1,995	2,190	48
Galloway	2,398	2,448	22
Hawkdun	8,181	8,977	66
Idaburn	565	565	8
Ida Valley	12,064	12,084	57
Last Chance	2,760	2,760	31
Manuherikia	4,873	4,893	75
Tarras	2,675	2,675	18
Teviot River	3,562	3,942	44
	43,106	44,972	440
Omakau (includes Dunstan and new Blackstone Hill area)	9,000	..	66
Totals	52,106	44,972	506

An area of 50 acres on the Bengerburn Scheme was eliminated as non-irrigable.

The total irrigable area commanded on all schemes is approximately 64,000 acres.

The financial results of the year's working were : Revenue, £26,730 ; working-expenses, £24,002 ; profit on working, £2,728.

The revenue shows an increase of £834 over last year's figure, but working-expenses also have increased by £712, leaving an increase in profit on working of £122. This revenue is the highest annual amount yet collected, the previous highest collection having been £25,980 in the 1938–39 season.

On the Omakau Scheme proper, where irrigation agreements are not in force but where water is purchased as required, the total quantity of water sold was 8,774 acre feet, as against 5,844 acre feet for the previous season. This falls short of the peak sales of 10,380 acre feet in the 1937–38 season. The demand for water on this scheme is still less than might be expected.

The recording of stream-flows, lake-levels, and meteorological data was carried out as in previous years.

CANTERBURY.

Operation and Maintenance of Irrigation Schemes.

Redcliff Scheme.—Irrigation commenced in the middle of October. The demand for water showed an increase of about 10 per cent. during the past season, the return for sales being £373. The working-expenses were £623. The area watered increased from 1,400 acres to approximately 1,550 acres, and the same beneficial results as in previous seasons have been obtained, although a number of farmers are not yet using the amount of water which they should.

Levels Scheme.—Irrigation commenced in the middle of October. On this scheme the returns showed a 25-per-cent. increase to £447. The working-expenses were £1,678. The number of farmers who availed themselves of irrigation increased from fifty-one in the previous year to fifty-eight in the season just passed. The area watered was approximately 1,800 acres. During the season farmers generally have been very keen to have at least part of their farms irrigated, which is a marked improvement on previous years. A steady increase in the sowing of good type pastures continues. More paddocks have been and are being border-dyked.

The completed schemes in operation are shown in the following table :—

Scheme.	Area actually irrigated.	Area for which Water is available.	Number of Irrigators.
	Acres.	Acres.	
Redcliffs	1,550	4,603	17
Levels	1,800	12,800	67

The financial result of the year's operations is as follows: Revenue, £844; working-expenses, £2,301.

SCHEMES UNDER CONSTRUCTION.

Rangitata Diversion Race.—This forty-two-mile diversion canal, which has a capacity of 1,150 cusecs and which will be capable of diverting almost the entire winter flow of the Rangitata River, has been designed to irrigate nearly a quarter of a million acres of the mid-Canterbury district. When not required for irrigation purposes the entire flow will be utilized by the Highbank Hydro-electric Station for the development of 36,000 horse-power.

The project will involve the excavation of nearly four and a quarter million cubic yards and the erection of a considerable number of reinforced-concrete structures. These include road bridges, drainage culverts, radial gate controls, and syphonic spillways. To enable the water to be passed under the Ashburton and Hinds Rivers and their tributaries, concrete conduits are required. Some of these will be constructed of precast concrete pipes having an internal diameter of 11 ft. On one difficult section of country a reinforced-concrete conduit is required and will extend for nearly 1¾ miles. This structure is being constructed of precast pipes which have an internal diameter of 12 ft. To date 400 ft. of this high-pressure syphon has been laid. The intake structure itself is nearing completion, and it is expected that towards the end of May the concrete caissons, which weigh approximately 700 tons each, will be floated out into the Rangitata River.

During the year another fifty-nine structures have been erected, the total number to date being eighty-five.

Excavation work is now spread over 40 miles of race, the total yardage to date being 3,222,000 cubic yards, and the yardage for this year being 939,000. The excavation work on this race is being carried out by thirty-six high-powered Diesel machines.

Surrey Hills Pipe-factory.—The establishment of this modern factory for the manufacture of large concrete pipes is now complete, and it will shortly be possible to produce five pipes daily. To date the factory has turned out forty-one pipes, which have an internal diameter of 12 ft., and weigh 28 tons. The modern methods employed in the manufacture, placing, and finally the steam-curing of the concrete enables the pipes to be handled forty-eight hours after pouring.

Eventually these pipes will be used on three large jobs—namely, the Surrey Hills high-pressure syphon, North and South Branch Ashburton River crossings, and on the upper portion of the penstock line for the Highbank Power-station. These structures will in each case be able to accommodate the entire flow of the Rangitata Diversion Race.

Ashburton-Lyndhurst Scheme.—This scheme, which is situated between the North Ashburton River and the Rakaia–Methven railway-line, has been designed to irrigate 34,000 acres, involving the formation of 132 miles of race containing 534,000 cubic yards of excavation.

Work for the year has been the excavation of 27 miles of race containing 60,000 cubic yards of excavation, bringing the total race formation to date to 124 miles and the race excavation to 502,000 cubic yards. The percentage of this work completed is 94.

Five hundred reinforced-concrete structures have been built during the year, making a grand total of 1,588. This figure represents 88 per cent. of the structures necessary to regulate the flow of water.

On this scheme an area which was prepared for demonstration purposes still possesses the best pasture in the district. One return issued by the Department of Agriculture showed that the area carried an average of 9·96 sheep per acre and averaged as high as 14·1 sheep per acre during the irrigation season.

All excavation work for the year has been carried out by Diesel-powered excavation plant.

Mayfield-Hinds Scheme.—This scheme is situated between the Rangitata and Hinds Rivers and is designed to irrigate 54,000 acres.

The race excavation will amount to 1,000,000 cubic yards and will require the formation of 210 miles of race. Approximately two thousand reinforced-concrete structures will be required to regulate the flow of water on this scheme.

Although progress has been considerably retarded as a result of war conditions, excavation by Diesel-powered plant has been pushed ahead. During the year 40 miles of race has been formed, containing 162,600 cubic yards, and 12 miles of fencing and 148 reinforced-concrete structures have been erected.

During the past few months carpenters on these works have been concentrated on erection of portable accommodation, and several units have been supplied in accordance with the Temporary Farm Workers' Accommodation Scheme.

CANTERBURY IRRIGATION INVESTIGATIONS.

Stream Gauging: Continuous records were obtained from eight automatic water-level recorders on major rivers. Discharge records during low flow periods were checked.

Soil Moisture and Rainfall: Observations and records of soil moisture and rainfall were continued at forty-four stations in Canterbury and Marlborough.

Evaporation: Continuous records of evaporation, wind-mileage, humidity, and temperature in the same districts were obtained from six stations.

Rainfall Run-off: Continuous records of rainfall were obtained from six high-level automatic rain-gauges in the North Ashburton River catchment area, and outfall from the catchment was measured continuously at the North Ashburton River automatic recorder.

Soil Survey: Soil acidity and fertility studies in the Ashburton County continued.

DOWNS WATER-SUPPLY SCHEME.

This scheme is now well advanced and 700 farms, covering 109,000 acres out of the total of 154,000 acres, are now being amply supplied with water for stock and domestic purposes.

Mains and Sub-mains: Although difficulty in obtaining steel has delayed deliveries of New-Zealand-made pipes, 37 miles, or 70 per cent. of the total, have now been laid.

Galvanized Pipes: Supplies from overseas are becoming increasingly difficult to obtain. A total of 572 miles, or 82 per cent., has now been laid.

Reservoirs: Five of the six reservoirs are now completed.

Pleasant Point Township: Reticulation of Pleasant Point, which includes provision of fire fighting mains, has been completed.

HYDRO-ELECTRIC DEVELOPMENT: CONSTRUCTION WORKS.

ARAPUNI POWER SCHEME.

The driving of the tunnels for penstock units Nos. 5 and 6, together with access shafts, porous drainage system, and the laying of rail tracks in concrete foundations, were completed. The two penstock gates were assembled and erected.

The 12-ft.-diameter steel tube lining of No. 6 tunnel has been placed for 122 ft., of which 110 ft. has been concreted.

The concrete foundations for No. 6 generator were completed to the first stage level, and formwork for No. 5 generator in well in hand.

At the outdoor substation concrete foundations are in course of construction.

The efforts to lower the level of tail-race water at the sand-bar were successful to the extent that a very definite improvement was observed in the release of water at the bar. Work was suspended owing to suitable plant not being available, and it appears that no reduction in water-level at the power-house will be effected until the bar is further lowered.

Boring operations at the eastern abutment of the Arapuni Dam were continued, ten additional bores of various depths and totalling 3,260 ft. having been drilled during the year. The sealing of certain bores with bituminous material has resulted in decreased discharge in the leakage, and investigations are still proceeding.

KARAPIRO POWER SCHEME.

Tunnelling.—Two working-shafts were sunk to depths of 120 ft. and 140 ft. respectively and equipped with electric lifts.

Dam.—Excavation was commenced on the right abutment, and generally the rock contours established by boring and geophysical surveys proved reasonably accurate.

Concreting.—Foundations were commenced for a batching plant and silo for cement. Experimental work has proceeded to ensure the suitability of various sands, and a large test-scale model is working satisfactorily. A contract has been let for the supply of the bulk of the crushed stone for concrete aggregate. Arrangements have been made for the mixing and delivery of large quantities of concrete by mechanical means.

Buildings and Quarters.—Administration and works buildings have been erected, and living-accommodation for the staff and workmen has been provided. Electricity, water-supply, and drainage systems have been installed.

Roading.—Access and internal roads have been constructed.

Permanent Village.—Thirteen permanent houses are under construction, and a contract has been let for erecting the water-tower.

General.—Progress with construction work generally has been affected through the inability to secure competent artisans.

TAUPO HEADWORKS.

The diversion cut in the Waikato River at the outlet from Lake Taupo has been well advanced. Of the excavation, approximately 80 per cent. of the material has been removed. The gate structure has been concreted to the underside of the slab.

Upstream from the gate structure sand and shingle is being removed from the channel, whilst downstream drilling plant is being operated from a barge in the removal of boulders, rock, reefs, &c.

WAIKAREMOANA LOWER DEVELOPMENT.

Whakamarino Canal.—This work is now completed. It consists of a concrete intake structure containing six wooden hand-operated gates leading into a reinforced concrete canal 187 ft. long and 16 ft. wide, which in turn runs into a double rectangular-shaped concrete inverted siphon. The siphon, with a horizontal leg of 91 ft., carries the water across the bed of the Waikaretaheke River 28 ft. below canal-level and then up into a trapezoidal section 584 ft. long to discharge into Lake Whakamarino. Access across the canal is provided by a small bridge.

Whakamarino Dam.—Boring and grouting the foundation of this dam was continued, 2,180 lineal feet of boring was completed, making a total of 4,150 lineal feet. Grouting used 304 tons of cement. The gate tower on the Kahutangaroa Culvert has been extended to its final level, and 21,250 cubic yards of selected clay placed on the dam and consolidated. The spillway structure, which is also complete, will house four automatic tipping gates, and the spilled water will run down a concrete slope to a specially-designed energy-breaker and a water-cushion. Work on the construction of these gates is in hand.

Whakamarino Lake.—The clearing of scrub and trees over the lake area of 80 acres is in hand.

Tunnel Intake and Earth Dam.—The rolled fill dam containing 3,500 cubic yards of selected material was completed along with the excavation for the tunnel intake structure.

Tunnel and Inverted Siphon.—Good progress was made from 5 faces with the construction of the 16-ft.-diameter water-tunnel, the total length of completed excavation being 7,419 ft. In the main tunnel system all excavation is completed except for a gap of 220 ft. where a heavy fall of some 80 ft. has delayed the work. A small section of 60 ft. also remains immediately adjacent to the surge-chamber. The concrete lining of the tunnel has been completed for a length of 5,658 ft.

Siphon at Surge-chamber.—Excavation is almost complete, 3,080 cubic yards of spoil having been removed.

Surge-chamber.—A total of 25,480 cubic yards of material has been removed, and a tank has been excavated below the chamber proper and the floor of it has been concreted. A pilot shaft has been sunk in the gate control shaft area.

Penstocks.—Both penstock tunnels to the surge-chamber are excavated, and the steel pipes have been placed in the western tunnel and concreted in. Between No. 1 and 2 anchor blocks trimming was completed and the bases of fourteen pedestals have been concreted, 176 cubic yards of concrete being placed. The foundation for No. 2 anchor block has been completed.

In the shaft section below No. 2 block the excavation has been completed and trimmed and stone toe walls at the toes of the batters put in.

The pipes in No. 3 anchor block were placed and concreted in.

Power-house.—To date the foundation walls and about half the concrete roof has been completed, a total of 3,923 cubic yards of concrete having been placed. The auxiliary units arrived during the year, and the main transformers are also on the job along with cable and miscellaneous gear.

Tail-race.—Deepening and widening of the old river-bed to form a tail-race was put in hand and 5,080 cubic yards of material removed.

Piripaua Village.—Two permanent cottages and a single man's quarters were completed.

Employees.—The total number of employees is 351.

COBB RIVER POWER SCHEME.

Since the Government took over this scheme the Department has carried on construction activities in connection with the headworks for this scheme.

The access road to the dam-site has been formed for a length of 6 m. 40 ch.

The original tunnel section is being enlarged to permit of a later increase in the generating capacity of this station—1,900 lineal feet had been driven to the original size, but this was enlarged during the year, and a further 1,893 lineal feet of driving to the new section was also completed.

Preliminary excavation near the power-house has been commenced, and boring on the dam-site is in progress.

LAKE TEKAPO POWER SCHEME.

Access roads to works and camp sites have been formed and metalled, and living-accommodation for staff and workmen has been erected, including water-supply and drainage systems, at all camps.

Administration buildings have also been erected, and a commencement has been made with the construction of buildings for the curing and storage of concrete tunnel-lining blocks.

At the inlet end of the power tunnel a shaft 25 ft. by 12 ft., clear of timber, has been sunk to a depth of 40 ft. below ground-level, and a tunnel enlargement to erect the shield-in has been commenced from the bottom of the shaft along the line of the tunnel.

At the outlet end of the tunnel an access adit 10 ft. by 10 ft. has been excavated for a length of 230 ft. A cutting has been opened up at the end of the adit and a concrete invert cast for the erection of the tunnel-driving shield.

Over 900,000 superficial feet of timber has been supplied to the works from local plantations.

HIGHBANK POWER SCHEME.

The power-house for this scheme is located 7½ miles from Methven on the south branch of the Rakaia River 777 ft. above sea-level, and at the end of the Rangitata Irrigation Race 42 miles from the intake on the Rangitata River.

The scheme will utilize the surplus water not required for irrigation, and a maximum of 1,000 cusecs will be available.

The supply will be conveyed to the power-house through a piped penstock line, the first section comprising 11-ft.-diameter precast concrete pipes and the remainder 9-ft.-diameter steel pipes. The single vertical shaft turbine will operate under a maximum gross head of 348 ft., generating 36,000 horse-power.

During the year under review 7,000 cubic yards have been excavated for the power-house foundations and 40,000 cubic yards have been taken out of the 46 chain tail-race.

A contract has been let for the power-house, and active work was commenced towards the end of the year. The sinking of the 5-ft. diameter concrete cylinders to form bases for the transmission-line river-crossing towers is in hand. Work is also in hand on the construction of the permanent village buildings.

CONSTRUCTION AND IMPROVEMENT OF ROADS AND BRIDGES.

Activities in respect of the construction and improvement of roads and bridges were on a much smaller scale than for the preceding year. Formation was completed over lengths totalling 235 miles, and metalling was undertaken over an aggregate length of 400 miles. A total length of 8,395 ft. of bridging was erected during the year, and over 32,000 lineal feet of culverting was installed.

Apart from the continuation of works already in hand at the beginning of the year, the programme largely comprised the formation, metalling, and bridging of access to farming localities where primary production would be benefited.

A summary of the larger works carried out during the year is as follows:—

The metalling of the Awanui–Mangonui Road was completed, and a reinforced-concrete bridge, 350 ft. in length, was erected across the Taipa River. There are still a number of smaller bridges to be erected on this road.

Formation and metalling of 5½ miles of the Waiotapu – Waikite Valley Road were completed, in order to provide access to lands under development by the Crown.

On the Rotorua–Waikaremoana Road a further length of 4 miles was metalled.

Work was continued on the direct road connecting Waiouru and Tokaanu, 10 miles of formation and 12 miles of metalling having been completed. One bridge 80 ft. in length was erected.

Only 4 miles of formation remains to be constructed between the sections of the Taumarunui – Tokaanu Road which have already been completed. During the year 3 miles of heavy bush were cleared, 2 miles 55 chains were formed, and 1 mile 23 chains were metalled.

The formation and base-course metalling of the Okau–Tongaporutu Road have been completed, thus providing a direct connection between the Ohura district and the Te Kuiti – New Plymouth State highway. The work done during the period under review consisted of 4 miles of formation and 6 miles of base-course metalling.

Good progress was made with the survey of the Napier–Taihape Road.

The Lower Hutt – Melling section of the Western Hutt Road has been completed, and the formation of the Petone – Lower Hutt section is well advanced, in readiness for surfacing next season. A considerable amount of work was involved in the moving of railway-tracks and signalling-equipment.

Formation has been completed on the Woodville–Ashhurst Road, which will provide an alternative to the Manawatu Gorge highway connecting the Hawke's Bay and Wellington districts. The erection of the Pohangina River Bridge, over 360 ft. in length, is in hand.

Improvements to the Springlands Junction – Matakitaki Section were continued.

On the Main South Westland Road, 3 miles of formation and 7 miles of metalling were completed on the Weheka–Haast Section. The erection of the Paringa River Bridge, 1,414 ft. in length, is in hand, and when finished will complete this section as far as is proposed at present. This will then afford an all-weather extension for a distance of 43 miles southwards from Weheka. On the Haast – Jackson's Bay Section, 5 miles 52 chains of formation and 9 miles 72 chains of metalling were completed. This portion of the proposed main road will, when constructed, provide all settlers south of the Haast River with access to Jackson's Bay, where shipping facilities are available. During the year the following bridges were completed: Okuru River (496 ft.), Waituna River (40 ft.), and Karangarua River (420 ft. suspension). The following structures are in course of erection: Turnbull River (496 ft.), Arawata South (200 ft.), and Arawata North (270 ft. suspension).

On the Makarora – Haast Road, full-width formation has now been completed for a distance of 17 miles from the commencement at the Makarora end, and half-width formation has been carried forward to the bridge-site at the Gates of the Haast. The reinforced-concrete bridge over the Fish River, consisting of one arch span, of 102 ft., and two approach spans each 14 ft., was completed. Construction work on this road has now been suspended.

The following table shows the extent of the surveys, formation, metalling, culverting, and bridging completed during the year in the respective public-works districts:—

District.	Engineering Surveys.	Formation.	Metalling.	Culverts.		Bridges.	
				Number.	Length.	Number.	Length.
	M. ch.	M. ch.	M. ch.		Ft.		Ft.
Whangarei	10 12	25 06	63 10	313	6,595	17	1,216
Auckland	31 21	58 37½	83 47½	210	4,417½	10	420
Tauranga..	..	12 59½	22 10½	90	2,426	3	101
Gisborne	1 60	14 66	19 59	178	4,347	2	330
Taumarunui	16 39	28 16	28 73	106	3,254	5	309
Stratford	1 38	7 56½	17 30½	3	444	2	135
Napier	1 20	11 29	31 9	11	1,054	2	241
Wellington	3 79	5 52	4 26	37	3,089	13	785
Nelson	1 16	7 29	8 12	63	1,068	2	50
Greymouth	8 33½	19 35	30 77	91	1,751	11	2,396
Christchurch	..	18 24½	36 0½	58	1,229	6	945
Dunedin	..	18 0	40 43½	63	1,477	6	308
Invercargill	..	7 75½	14 43½	35	1,163	3	159½
Totals	75 78½	235 6½	400 42	1,258	32,312½	82	8,395½

LANDS-IMPROVEMENT.

WHANGAREI DISTRICT.

Sand-dune Reclamation.—Kaitaia Area: The work carried out during the period under review consisted of tree-planting, lupin-sowing, marram-grass planting, and general maintenance.

Tree-planting extended over three months, during which 233,000 trees were planted covering approximately 200 acres. Most of the plants were produced at the Department's nursery at Waipapakauri. The results to date have been very satisfactory.

The quantity of lupin-seed sown was 4,472 lb., most of which was sown in the autumn near Waipapakauri with excellent results.

Marram-grass was planted out over a total area exceeding 400 acres, of which the greater plantations were at Te Kao and Greenfields.

Experiments have been made in the sowing of lupin and other seed by aircraft, and these show an appreciable reduction in cost as compared with hand methods.

Te Kopuru Area: Operations were confined to tree and marram-grass planting and lupin-sowing. Approximately 50 acres of trees and 35 acres of marram-grass were planted.

Hokianga Harbour Tidal Flats Reclamation.—At Tullock's, the reclamation stop-bank has been stone protected throughout the length of 70 chains which was subject to erosion by sea.

The Rawene area of 200 acres which was cleared of mangroves has been stumped in preparation for further development of the area.

Willow-clearing.—A contract has been let for the clearing of willows from 190 chains of the Waionehu Stream.

Scattered willows have been removed over a length of 107 chains of the Waiotu Stream, while the removal of heavy willow growth, the construction of diverts, and ring-barking were also carried out over a length of 40 chains.

Swamp Drainage.—Proposals were prepared for enlarging the Ruawai and Naumai stop-banks over a length of 6 miles, and towards the end of the year a contract was let by the Raupo Drainage Board. This work conforms to the comprehensive scheme of drainage improvements on the Ruawai Flats.

Investigations were made and proposals were prepared in respect of a number of drainage problems, and these are under consideration.

AUCKLAND DISTRICT.

Kaipara Harbour Flats Reclamation, Glorit Section.—During the year 266 acres were disked and harrowed, 72 acres sown in grass, and 256 acres top-dressed. Wire fencing was erected over a length of 2 miles 12 chains. Two bores were sunk, a water-pump was installed, 7,126 ft. of reticulation pipes were laid, and sixteen concrete troughs, with approaches, were completed. The eradication of fescue was continued, an area of 485 acres being treated.

Kaipara Harbour Flats Reclamation, Kukutango Block and Oyster Point.—On this block, 148 acres of mangroves were cleared and burned, and on the stop-banks 35 chains were fascined, 55 chains grassed, and 65 chains repaired. Four drain-crossing bridges were erected, 490 chains of lateral drains were cut, and 449 chains of drain were deepened or cleared. Fencing was erected over a length of 729 chains, roading was formed for a length of 65 chains and metalled for 86 chains, while 142 ft. of culverting was laid. The metalling of the access road on the Oyster Point Block was almost completed.

Sand-dune Reclamation.—Woodhill–Helensville: Replanting of marram-grass was carried out over an area of 1,014 acres and tree-planting over an area of 320 acres. One hundred and thirty-four miles of new lines were cut and 1,486 miles of lines were cleared. Firebreaks totalling an area of 906 square chains were cleared and 6 miles of fore-dune fencing erected. In the tree nursery, 524,000 trees were lined out.

North Waikato Heads and Kariotahi.—Marram-grass was planted over an area of 500 acres, including 265 acres of new country. Four thousand pound of lupin-seed were sown with good results, and a large quantity of seed was gathered for the next season's requirements. Tree-planting covered an area of 358 acres, bringing the total to 1,026 acres. A total of 1,993 miles of tree lines were cleared and 38 chains of sand-arresting fences were erected on the fore-dunes. Over 400,000 yearling trees were lined out in readiness for the ensuing season.

Rabbits have caused a good deal of damage, and, in addition to regular trapping, experimental measures for poisoning were carried out at the request of the Agriculture Department, and the results were most satisfactory.

South Kaipara Heads.—Replanting of marram-grass was undertaken over an area of 345 acres, and 1,700 lb. of lupin-seed were sown. The work previously carried out at this location is in excellent condition.

Hauraki Plains East Water-supply.—This scheme was completed and the whole area is now being served.

Mangaorongo Stream Willow-clearing.—An additional length of 2 miles 37 chains of stream-bed has been cleared of willows by means of tractor and winch. The growth is extraordinarily heavy, but the general effect of the improvements has been to lower the normal water level 7 ft. at the Main Trunk Railway crossing at Kio Kio. The lowering of the water-level exposed large logs where the steam winch had previously worked, and these were also removed.

Matatoki Drainage Scheme.—Excavation was carried out over a length of 57 chains of the Matatoki Drain and 99 chains of the Warahoe Drain. Culverting totalling 322 ft. was laid, and twenty-five floodgates were completed. One 30 ft. span bridge was erected on Matatoki Road and one 17 ft. span bridge on Wainui Road.

Paeroa Drainage Scheme.—Drains have been excavated and stop-banks erected for a length of 113 chains. Two 25 ft. M.A.H. bridges and one 24 ft. reinforced-concrete box culvert were constructed, while 192 ft. of culverting was placed under stop-banks and 25 chains of drain were fenced.

Turua Township Stop-banks.—In order to conform to the new alignment and levels, 46 chains of stop-banking were constructed and four floodgates and culverts were completed.

TAURANGA DISTRICT.

Judea Swamp Drainage.—The widening and deepening of this stream was continued and a total length of 4 miles 54 chains has now been completed.

Otara River Erosion.—The erection of protective groynes, comprising sheathed piling, was completed.

TAUMARUNUI DISTRICT.

Mokau River Willow-clearing.—The work of ring-barking and poisoning willow growth was continued, and generally successful results have been obtained from the activities of previous years.

Mangapu Drainage Board.—This Drainage Board has carried out further clearing of the Mangapu Stream, with financial assistance from the Government.

WELLINGTON DISTRICT.

Sand-dune Reclamation (Hokio to Manawatu River).—Good progress has been made with the stabilizing of sand-dunes by planting marram-grass and lupin. Tree-planting was continued, but owing to the loss of seedling trees through a storm only 94,000 trees were planted during the season.

Manawatu River (Whirokino Cut).—Towards the end of the year under review a contract was let for the excavation of the new channel some 53 chains in length. This work is situated about 1½ miles down-stream from the Whirokino Bridge on the State highway. The dimensions of the cut will be 35 ft. deep from mean surface level and a bottom width of 20 ft., the quantity to be taken out being 372,000 cubic yards.

Flaxmilling Industry (Rehabilitation Plan).—Work has been in progress with the clearing and planting of the Moutoa Estate, near Foxton. Heavy clearing has been carried out over an area of 314 acres and light clearing over 572 acres. Of the existing flax plantations, 125 acres have been thickened and 509 acres of new planting completed. The formation and metalling of 2 miles 40 chains of road were also undertaken.

NELSON DISTRICT.

Awatere Water-supply.—This scheme, which is being carried out by contract arranged by the Awatere County Council with assistance from the Government, is nearing completion. The principal work undertaken during the year was the laying of pipes for reticulation. A total length of 91,500 ft. of pipes, ranging in size from ¾ in. to 6 in., was laid, together with the necessary fittings and service connections.

CHRISTCHURCH DISTRICT.

Ashburton and Hinds Rivers Flood Control.—A floodway of 1,400 acres has been cleared of willows and scrub to date, of which 1,200 acres were in the main stream and the balance in the north branch. Stop-banks totalling 7 miles have been erected in the Tinwald and Wakanui districts. A recent major flood proved the effectiveness of the partial scheme already completed, many thousands of acres which were formerly subjected to periodical flooding being saved from inundation.

Lake Ellesmere and Lake Forsyth Drainage.—Investigations have been made with a view to preparing a comprehensive report upon the possible methods of constructing outlets for these lakes.

GREYMOUTH DISTRICT.

Karamea Flood Control.—Repairs to the Otumahana wall were completed, and further stone was placed to arrest the erosion at Hall's and Simpson's. Quinlan's filling was completely restored and the bank at Ferris's overflow was turfed.

The year's output from the Oparara Quarry was 3,609 tons of stone, the whole of this quantity being utilized.

Oparara River Protection.—As a result of severe flooding which occurred in February, 1940, it became necessary to carry out repairs and further protective work. Quarry rock was used for facing sections of bank where erosion had taken place. An old bridge approach was removed to allow flood-waters to escape freely.

Arahura River Protection.—A small amount of work was undertaken to strengthen the protection previously constructed. Two log groynes with boulder filling were erected to divert branches of the main stream away from certain stop-banks.

Hokitika River Erosion (Moynihan's).—A stop-bank was constructed, 12 ft. high and 11 chains long, across an overflow channel, together with scrub-mattress and willow-plantation protection.

Kokatahi River Erosion (O'Reilly's).—A stop-bank, 17 chains long and up to 13 ft. in height, was constructed across an overflow channel to prevent erosion down-stream. Heavy scrub-mattress protection was carried out on the down-stream end of the stop-bank.

Little Wanganui River Erosion.—New stop-banking averaging 10 ft. in height was erected over a length of 22 chains, and 20 chains of old stop-banking were raised and strengthened. Heavy wire crate mattress protection was provided at the head of two old pile groynes and 2 chains of continuous scrub-mattress protection were completed.

HARBOUR WORKS.

Houhora Wharf.—The contract for the erection of a bridge at Pukenui has been let and work is in hand.

Orapiu Wharf; Beachlands Slipway; Waiheke Island.—The wharf at Beachlands was demolished and a slipway constructed with the materials therefrom. Reconstruction of Orapiu Wharf was also completed by the same contractors.

Tairua Wharf.—The reconditioning of this wharf was completed by the Thames County Council.

Helensville Creek Beacon, Kaipara Harbour.—General maintenance was carried out during the year.

Bruce Bay.—Surveys have been made and plans are being prepared for a proposed wharf at this location.

Westhaven Wharf.—The construction of a breastwork and approach road are in hand on this site.

Havelock Wharf.—Repairs and extensions are being undertaken, and all preliminary work is completed prior to letting a contract for construction of this wharf.

Momorangi Bay.—The site has been surveyed and plans are in hand for a jetty on this site.

Elaine (Brown's) Bay.—Plans have been prepared for a jetty and access track to be constructed here.

Endeavour Inlet.—A 34 ft. jetty has been constructed on Endeavour Inlet during the year.

Fairy Bay Wharf.—Plans have been completed for this wharf.

Kumutoto Bay.—Plans are in hand for the provision of a wharf with launch steps at this location.

Ships Cove.—The construction of a jetty with launch steps has been completed.

Tennyson Inlet.—A jetty complete with launch steps, access road, and approach has been constructed here.

LIGHTHOUSES.

Moko Hinau.—A fuel-oil store has been erected, the Diesel engines overhauled, and repairs and maintenance carried out to the electrical equipment.

Cuvier Island.—Routine maintenance has been carried out on the Diesel engines and electrical equipment.

Godley Head.—The site for the new lighthouse has been constructed involving some 300 cubic yards of excavation in rock. All electrical equipment is on order, and the lens and lantern ex Cape Foulwind are being reconditioned ready for installation. Arrangements are in hand for the construction of the power-line to the new site.

Akaroa.—A contract has been let for the erection of a Blondin cableway over the inlet at this station to replace obsolete landing-equipment.

Puysegur Point.—The power-house in connection with electrification has been completed and the access road approximately 2 miles long constructed. All material and equipment for electrification and installation of radio beacon is being assembled at Invercargill ready for transport and installation.

Moeraki.—A small hut has been erected to accommodate an extra man, and power-lines have been run to the station for electrification. The cottages and buildings are now supplied with electricity, and equipment is on order to electrify the light.

Centre Island.—Extension of the cottage drainage is in hand.

Portland Island.—A generating set ex Stephens Island has been installed to provide power for radio-beacon purposes. Trial surveys have been carried out for the erection of a Diesel winch and tramway to improve access to the station and also surveys of sites for three new cottages for the keepers.

Baring Head.—Routine maintenance of plant and equipment has been carried out during the year. A cross-over connection between this station and the adjacent naval station has been provided to allow for an interchange of power in case of emergency.

Hen Island.—The erection of a light-tower and the cableway necessary for servicing is in hand and is now nearing completion. The existing light on the Chickens will be extinguished on completion of this work.

Cape Reinga.—A considerable amount of work has been carried out during the year. This includes the erection of two keepers' dwellings, light-tower, and power-house. The construction of a combined garage and fuel-store is in hand, also the erection of a flashing beacon on the mainland at Cape Maria.

The installation of plant and equipment in connection with the radio beacon and electrification has been completed, and the work of erecting the tower-lantern and equipment ex Cape Maria is in hand. With the exception of a 30 ft. bridge, which is in hand, the access road from Te Paki is now completed.

Cape Maria.—This station was completely dismantled during the year, the keepers being transferred to Cape Reinga. Everything salvagable was taken off the island, and the lighthouse lantern and equipment transferred to Reinga. When this light was extinguished a temporary electric light was exhibited at Reinga. Cape Maria Island no longer exists as a lighthouse station.

Tutukaka Heads.—An automatic flashing beacon has been erected on this location by the Whangarei Harbour Board under the direction of this Department.

Cape Campbell.—All buildings and the lighthouse tower have been painted and minor repairs carried out. During the year all electrical equipment received routine maintenance. A fuel-oil store has been erected adjacent to the power-house.

Stephens Island.—Routine maintenance has been carried out on this station during the year, and the construction of a fuel-oil store is in hand.

Jackson's Bay.—The tower for an automatic flashing light and a cableway for serviceing have been erected ready for the installation of the beacon.

Clay Point (Tory Channel).—A tower for an automatic flashing light has been erected and an approach track constructed on this location.

Castlepoint.—Minor adjustments were carried out at this station, occasioned by the mechanism being displaced by an earthquake.

LAND-CLEARANCE BY MACHINERY.

Good progress has been maintained with the scheme for making available for hire to farmers heavy constructional machinery suitable for bringing into production large areas of land which have remained uncultivated throughout the years owing to the difficulty and high cost by ordinary methods of carrying out stumping, logging, clearing, ploughing, &c.

Eighteen heavy tractors have been employed on this scheme during the year, and the following work was completed :—

Public Works District.	Stumping and Clearing.	Ploughing and Cultivating.	Internal (Farm) Road and Track Formation.
	Acres.	Acres.	M. ch.
Tauranga	630	..	13 36
Taumarunui	1,100	..	..
Stratford	4,402	2,076	5 77
Nelson	874	438	4 0
Westport	711	536	0 20
Greymouth..	103	..	..
Dunedin	431	..	22 1
Invercargill	1,749	..	24 7
Totals	10,000	3,050	69 61

In addition, improvements to creek channels, using drag-line excavators, have been a feature of the programme in Southland, 4 miles 27 chains having been dealt with by machinery during the year, along with 5 miles 67 chains of stop-bank formation.

TEMPORARY ACCOMMODATION FOR FARM WORKERS.

To meet the shortage of accommodation for farm workers, especially married couples, a scheme was initiated early in 1940 whereby standard Public Works hutments were made available to farmers on very reasonable terms. During the year the number of hutments supplied was as follows, the period of tenancy in most cases being the duration of the war and one season thereafter :—

District.	Married Men's Quarters.	Single Men's Quarters.
Whangarei	32	6
Auckland	271	58
Tauranga	44	20
Gisborne	11	7
Napier	22	15
Taumarunui	9	2
Stratford	164	25
Wellington	58	20
Nelson	15	11
Christchurch	15	6
Dunedin	30	5
Totals	671	175

DEFENCE WORKS.

During the year the Department continued a very large programme of construction works on behalf of the Army, Navy, and Air Departments in connection with the Dominion's defence requirements. This programme included the erection of numerous buildings, together with the installation of services for water-supply, sewerage, electric power, and other facilities. The extent of such work may be described as comprising approximately one-third of the whole of the Department's activities for the year under review.

IMPROVEMENTS TO PUBLIC-SCHOOL GROUNDS.

Various improvements to school-grounds throughout the Dominion were carried out during the year in accordance with proposals approved by the Education Department.

This class of work was undertaken by the Public Works Department where the Government, through the Education Department, provided substantial financial assistance or met the whole of the cost involved.

HOUSING CONSTRUCTION.

In connection with the Government housing scheme, this Department again carried out a considerable amount of work on behalf of the Housing Construction Department. This work covered principally subdivisional roading, including kerbing, channelling, and storm-water drainage, and the clearing and levelling of building-sites.

PUBLIC BUILDINGS AND ELECTRICAL OPERATIONS.

Details of public-buildings works and of the operations of the State hydro-electric undertakings are contained in the separate reports, included herewith, by the Government Architect and the Chief Electrical Engineer, respectively.

I have, &c.,
W. L. Newnham, A.M.Inst.C.E.,
Engineer-in-Chief.

APPENDIX C.

ANNUAL REPORT ON BUILDINGS BY THE GOVERNMENT ARCHITECT.

The Government Architect to the Hon. the Minister of Public Works.

Sir,—

I have the honour to submit the following report on the activities of the Architectural Branch for the year ended 31st March, 1941.

During the year plans were prepared for 782 buildings of an estimated value of £2,070,021, and contracts totalling £1,174,365 have been let. Contracts to the value of £340,346 for buildings designed prior to 1st April, 1940, have also been let, making the total value of building contracts let during the year £1,514,711.

In addition to the above, buildings have been designed and erected by other branches in Head Office and by District Offices in connection with railway-construction, main highways, hydro-electric works, and other activities of this Department.

During the year a major part of the organization of the Department was engaged in an urgent defence programme, involving extensive expansion to R.N.Z.A.F. aerodromes, large training camps at a number of military centres, and the establishment of naval and military coastal defence works.

Many materials and fittings previously imported have been difficult or impossible to obtain, but New Zealand manufacturers have risen to the occasion and produced satisfactory substitutes for the majority of them at reasonable prices.

Appended is a schedule of work, which includes maintenance work and contracts prepared in various District Offices.

During the year nine members of my staff volunteered and were accepted for military service, bringing the total now serving up to fourteen. In conclusion, I wish to place on record my appreciation of the efficient and loyal manner in which my staff responded to the heavy demands made upon them.

Vice-Regal.

Wellington.—Extensive renovations and repairs were executed at Government House.

Department of Agriculture.

Whangarei.—Office accommodation was arranged at Kaikohe and Dargaville.

Auckland.—At Ruakura a grass-drier plant was installed, and at Te Kauwhata a wine-storage building and still were erected.

Stratford.—Renovations were made to the dormitory block at Bulls.

Wellington.—At Wallaceville several buildings were erected and a new animal health laboratory building was completed and officially opened. A metabolism shed was completed. Alterations were carried out at two other places.

Canterbury.—Four buildings were erected at Canterbury Agricultural College, including a wheat research building and further extensions to the glasshouse.

Dunedin.—A new office was erected at Ranfurly and renewals were made to roofs of the dwelling and stables at Tapanui and repairs done at three other places.

Education Department.

Whangarei.—Extensions, renovations, and repairs were executed at the local high school.

Auckland.—A housemaster's cottage at Owairaka was completed, and general maintenance was carried out at four Child Welfare Homes.

Tauranga.—A water-supply was installed at Pukehina School, and repairs and drainage-work done at Maraenui Native School.

Napier District.—Extensive ground improvements and renovations were carried out at Greenmeadows.

Stratford.—Substantial additions were made to the engineering block and heating services installed at Hawera Technical School, and at Stratford Technical School the erection of three modern classrooms was completed.

Gisborne.—Additions and renovations were carried out at three institutions and ground improvements at three Native schools.

At Gisborne High School painting and renovations were carried out and a shed for bicycles erected.

Nelson.—Nelson Boys' College and Marlborough College are still under construction.

Dunedin.—At the Special School, Otekaike, a new glasshouse was built and a heating system installed.

Invercargill.—At Gore High School a new technical block has been completed.

HEALTH DEPARTMENT.

Whangarei.—Thirty hutments for Native T.B. patients were completed.

Tauranga.—A start has been made on the foundations for a new sanatorium at Rotorua, and forty privies for Maoris were completed at Whakatane. Repair work was carried out to three district nurses' cottages.

Gisborne.—The construction of one T.B. hutment and forty tube privies was carried out.

Stratford.—At New Plymouth two huts were erected for T.B. Maoris and tube privies for Maoris at various pahs and farms in the district. A garage was built for the district nurse at Opunake.

Wellington.—Renewals and additions were carried out at four places.

Nelson.—One hutment for T.B. Maoris was erected at Wairau.

Christchurch.—The male pavilion at Queen Mary Hospital, Hanmer, was completed. Painting, renovations, and repairs were made to three buildings.

Invercargill.—The new labour block at St. Helens is nearing completion. General renovations were carried out at the main hospital and nurses' home.

JUSTICE DEPARTMENT.

Courthouses.

Tauranga.—Extensive renovations and repairs were executed at Whakatane and Opotiki, and a septic tank and drainage system was installed at the latter place.

Gisborne.—Extensive renovations and alterations have been done at Ruatoria. A new building is being erected.

Wellington.—Alterations and additions were made at Wellington.

Dunedin.—At Oamaru an electric heating system was installed and at Cromwell a sewerage system laid. The Arrowtown Courthouse was shifted to Omakau.

Invercargill.—The new Invercargill building is very nearly completed.

Prisons.

Auckland.—At Waikeria Borstal Institute two staff cottages were erected and a pasteurization and bottling plant was installed.

Invercargill.—Extensive renovations and alterations were carried out at the Borstal Institution.

MENTAL HOSPITALS DEPARTMENT.

Auckland.—The nurses' home at Kingseat, together with renovations to villas 12 and 13, has been completed. At Avondale a hairdressing-saloon and glasshouse, and at Tokanui, villa No. 4, with new slaughterhouse and equipment, were erected.

General alterations and maintenance were carried out at several other places.

Wellington.—At Porirua the contract for demolition of towers and making good is approaching completion. Reroofing of the farm block is in hand.

Christchurch.—A new villa No. 5 at Templeton is under construction.

Nelson.—At Ngawhatu three new villas were completed and at Nelson repairs were made to the main building.

Greymouth.—The construction of the nurses' home also additions to the laundry building are almost complete.

NATIONAL AND COMMERCIAL BROADCASTING SERVICES.

Christchurch.—At 3YA fresh staff accommodation of six rooms was erected. Painting and renovations were carried out at 3ZB.

Invercargill.—A five-roomed residence was erected at Dacre.

NATIVE DEPARTMENT.

Whangarei.—Seventy new houses, one hutment, and ten cowsheds were erected, and eight renovations carried out.

Auckland.—Thirty-two Native houses were completed, and alterations and additions made to a number of dwellings.

Taumarunui.—At Nihoniho and Taumarunui houses were built, and ten were completed at Te Kuiti.

Tauranga.—Twelve cottages were constructed under the Native Housing Scheme, and thirteen cottages, eleven cow-sheds, and one wool-shed under the Native Development Scheme. Eleven alterations and forty-four painting jobs were attended to.

Napier.—Nine residences were erected, and repairs and additions made to six others.

Stratford.—At Hawera new office accommodation was arranged, and at New Plymouth renovations were carried out at the hostel.

Gisborne.—Ninety houses were erected in this district. Maintenance was carried out at the Native Land Department Buildings.

POLICE DEPARTMENT.

Whangarei.—At Kaitaia a new building was erected.

Auckland.—At St. Heliers a new station and residence was erected.

Tauranga.—A new cottage was erected at Waikune and a new station at Rotorua.

Wellington.—At Miramar a new residence and station was erected and a new station built at Levin.

Nelson.—At Motueka a new garage has been built.

Christchurch.—Five new residences were erected—namely, Little River, Cheviot, Glenavy, Waimate, and Riccarton.

Dunedin.—New buildings were erected at Port Chalmers and Naseby and a new office and lock-up constructed at Lawrence.

Invercargill.—Alterations and renovations were carried out at five stations.

POST AND TELEGRAPH DEPARTMENT.

Auckland.—The additions to the Chief Post-office were completed and extensive alterations were made to the top floor. New post-offices and residences were erected at Kaukapakapa and Browns Bay. Alterations and additions were carried out at five post-offices and six telephone-exchanges. Extensive alterations and additions were completed at Newmarket.

Taumarunui.—A new post-office and residence at Taupo was completed.

Tauranga.—A new garage and line store was erected and maintenance of two other post-offices attended to.

Stratford.—At Fitzroy a new garage was erected and a new garage and store at Stratford is being built. Renovations and alterations to nine post-offices were attended to.

Wellington.—At Palmerston North alterations and additions have been completed. At Lower Hutt a new office is being erected.

Extensive renovations have been carried out at the General Post Office, Wellington, and maintenance carried out to two other buildings.

Nelson.—A new store and garage has been completed and renovations made at two other offices.

Christchurch.—Extensive alterations and renovations were carried out at Timaru Post-office.

Dunedin.—At Mosgiel a new post-office and residence was erected and repairs and renewals were carried out at four offices.

Invercargill.—A new post-office at Invercargill is almost completed. A new radio-receiving station is being erected at Awarua, and the old station converted into living quarters for single staff.

SOCIAL SECURITY DEPARTMENT.

Whangarei.—Additional office accommodation was provided at Whangarei and Dargaville, and accommodation at Kaitaia.

Taumarunui.—Alterations were carried out at Taumarunui and Te Kuiti.

Tauranga.—New office accommodation was arranged at Whakatane and Rotorua.

Stratford.—Alterations and additions were carried out at New Plymouth and Stratford.

Wellington.—Repairs and alterations were carried out at Aotea Quay.

TOURIST DEPARTMENT.

Chateau Tongariro.—Refrigeration machinery has been installed and extensive renewals and repairs to the heating system were carried out.

Waikaremoana Lake House.—Additions were made to the kitchen and a new drying room erected and the electric installation was reconditioned.

Invercargill.—Renovations and alterations were carried out at Te Anau and Milford.

MISCELLANEOUS.

Whangarei.—For the State Advances Department Rural Housing Scheme, thirty-eight married quarters and seven single quarters were completed. Three farmers were supplied with accommodation for seasonal workers. Renovations were carried out to six small farm cottages under the Small Farms Scheme.

Auckland.—The new building at Jean Batten Place is nearing completion, the probability being that the first three floors will be occupied some time in June. At Hamilton the Knox Street garage has been completed. A surfaceman's cottage and a garage were erected at Tirau. Renovations and additions were carried out at twelve Government Departments.

Tauranga.—New premises were fitted out for the State Fire Office. Six staff cottages and two surfacemen's cottages were erected at Taupo for the Main Highways Board. Forty-two married quarters and twenty-one single men's huts were erected under the Temporary Accommodation for Farm Workers' Scheme.

Gisborne.—A new depot at Awapuni Road was erected for the Department. The erection of a mechanical workshop is in hand. For the State Advances Department eleven married and ten single quarters were completed under the Rural Housing Scheme.

Taumarunui.—At Taumarunui an oil-store has been installed in the Public Works garage, and alterations to the grounds and departmental residence carried out. For the State Advances Department nine married and two single men's quarters were erected under the Temporary Accommodation for Farm Workers' Scheme.

Napier.—Internal Marketing Department: At the Hastings cool-store work on the insulating-chambers is well in hand. The well has been driven to 274 ft. Twenty-six married and fifteen single quarters were erected under the Small Farms Scheme. Thirty-five bicycle-racks were erected and general ground improvements were carried out at the Government Buildings. A five-roomed cottage was erected at Te Haroto and a three-roomed cottage at Caption Bridge for the Main Highways Board.

Stratford.—A new Plant Depot was constructed at Smart Road, New Plymouth. Office accommodation was arranged at New Plymouth and Wanganui.

Wellington.—The new Government Life Insurance Building is complete and is now fully occupied. The new dental clinic at Willis Street has been completed. The Stout Street building is about two-thirds complete, and work is going ahead steadily. Additions to the workshops have been completed at the Public Works Department, Palmerston North.

At Foxton several new buildings have been erected for New Zealand Woolpack and Textiles under the Flax Rehabilitation Plan. For the State Advances Corporation fifty-eight cottages for married workers and twenty huts for single men have been erected under the accommodation for Farm Workers' Scheme.

Nelson.—At Port Nelson a cool-store for the Internal Marketing Department is almost complete. At Cape Campbell renovations and painting to the lighthouse were carried out, and at Kahurangi Point the keeper's dwelling was removed to a new site on account of sea erosion. At Picton alterations and repairs were made to the Harbourmaster's residence. A linen-flax factory was erected at Blenheim. At Nelson a new laboratory and additions to the staff quarters was completed at the Tobacco Research Station.

Christchurch.—Linen-flax factories are almost complete at Leeston, Oxford, Methven, Washdyke, and Makikihi.

Greymouth.—Additions to the new Government Buildings are completed. Office accommodation for the Geological Survey was arranged.

Dunedin.—Ten cottages were erected for farm workers under the Temporary Accommodation for Farm Workers' Scheme. Alterations were carried out at three offices in addition to extensive alterations and renovations at the Customs Building.

Invercargill.—New factories were erected for the linen-flax industry—viz.: At Winton a new building for treating fibre and four temporary married quarters and a number of huts for single men have been erected; and at Otautau a similar programme is in being. For the State Advances Corporation thirty small married quarters have been erected under the Temporary Accommodation for Farm Workers' Scheme.

MAINTENANCE.

General maintenance and renovations were carried out as required in all districts.

I have, &c.,

JOHN T. MAIR, F.R.I.B.A., F.I.A.A.
Government Architect.

APPENDIX D.

ANNUAL REPORT OF THE CHIEF ELECTRICAL ENGINEER.

The Chief Electrical Engineer to the Hon. the Minister of Public Works.

Sir,—

I beg to report on the position of the development of electric power in the Dominion for the past year, as follows:—

GENERATING-SCHEMES IN OPERATION.

NORTH ISLAND ELECTRIC POWER SYSTEM.

1. Capital Outlay.

At the close of the year 1940–41 the total capital outlay was £9,843,028 representing assets in operation, and £1,718,677 representing assets not in operation, giving a total capital outlay of £11,561,705, and Table II gives an analysis of this amount.

2. Financial Results.

The total revenue for the year amounted to £1,533,136 and working-expenses £640,884, which resulted in a gross profit of £892,252, equal to a return of 9·37 per cent. on the average capital in operation (£9,519,865).

The interest charge for the year was £336,073, and as the statutory limit had been reached for the Depreciation Reserve, no payment was necessary to that account. The net profit was therefore £556,179, of which £284,532 was paid for income-tax, national security tax, and social security charge, £148,937 was appropriated to sinking fund, and the balance of £122,710 was transferred to the reserve fund.

Comparative figures for the year ending 31st March, 1940, are as follows: Revenue, £1,328,499; working-expenses, £368,015; interest, £345,207; depreciation, £15,477; with a net profit of £599,800.

The accumulated Reserves and Sinking Funds as at 31st March, 1941, amounted to £2,725,542 Table I gives full particulars of financial results as well as other relevant statistical information.

3. System Operation and Load Despatching.

Arapuni and Horahora were run continuously in parallel with Waikaremoana and Mangahao stations for normal operation, and assistance was obtained from auxiliary stations as required.

The radio phone channel in connection with load dispatching between Hamilton, Mangahao, and Tuai has been satisfactory, and is being extended to provide an additional band to cover "poor reception" period.

Control of the following stations was taken over in March, 1941: Napier, Taihape, Patea, Te Aroha, Thames, and Tauranga Borough Councils; South Taranaki and Poverty Bay Electric-power Boards; and Kaponga Town Board.

The Mangahao dams were emptied on 5th March, 1941. The station was shut down altogether for five days and limited to half-load until 8th April, 1941, while one pipe-line was painted.

The following are the maximum daily and weekly outputs of units from the main stations:—

April, 1940, to March, 1941.

	Greatest Daily Units.	Greatest Weekly Units.
System ..	3,949,000, 2nd July, 1940	25,820,000, week ended 7th July, 1940.
King's Wharf ..	747,930, 7th August, 1940	3,891,950, week ended 11th August, 1940.
Evans Bay ..	530,450, 6th August, 1940	3,317,600, week ended 11th August, 1940.
Arapuni ..	2,561,700, 25th March, 1941	16,048,000, week ended 30th March, 1941.
Mangahao ..	440,480, 27th May, 1940	2,950,810, week ended 16th February, 1941.
Tuai	694,400, 19th August, 1940	4,527,910, week ended 18th August, 1940.
Horahora ..	285,360, 21st March, 1941	1,887,150, week ended 24th November, 1940.
Stratford line ..	873,360, 21st March, 1941	4,842,400, week ended 30th March, 1941.

The following coal was burnt at King's Wharf during the period April, 1940, to March, 1941: April, 111 tons; May, 4,880 tons; June, 4,612 tons; July, 11,842 tons; August, 10,595 tons; September, 3,109 tons; October, 956 tons; November, 666 tons; December, 1,432 tons; January, 4,135 tons; February, 3,120 tons; March, 5,929 tons. Total coal burnt for period, 51,387 tons.

The greatest amount of coal burnt in one week at King's Wharf was 3,881 tons from 5th to 11th August, 1940, inclusive.

Water was lost over the spillway at Arapuni on the following dates: 7th, 8th, and 9th April, 11th November, 15th to 26th November, and 30th December to 3rd January.

4. General.

The units generated and purchased totalled 1,245,947,813 for the system. Units actually sold totalled 1,122,692,042 and units used for station auxiliaries, &c., totalled 5,500,429.

The balance of 117,755,342 units represents transmission and distribution losses amounting to 9·451 per cent. of the total output.

The maximum load on the system was 246,700 kW. and the annual load factor 57·65 per cent. The total connected load was 1,587,056 kW., and the demand factor or ratio of maximum load to connected load was 15·54 per cent.

War conditions are accountable for non-arrival and late deliveries of much material ordered. The load on the system is, however, steadily increasing, and every effort is being made to safeguard the supply, with satisfactory results.

The need, however, for load curtailment on the part of supply authorities is still extremely urgent, and it is hoped that recent requests to this end will have a pronounced tendency to ease the strain during the coming winter.

5. Construction, Operation, and Maintenance.

A. HAMILTON DISTRICT.

(1) Construction.

(a) *Power-stations.*

Arapuni.—The General Branch completed excavations for Nos. 5 and 6 penstock tunnels and the installation of the penstock gates. The contractor for the supply and installation of the steel linings in the penstock tunnels has so far placed 122 ft. of steel pipe in No. 6 tunnel, 110 ft. of which has been concreted in position. The new transformers (24,000 kVA.) for Nos. 5 and 6 units have been dried out and placed in position.

Karapiro.—Substations were installed to provide supply for these works.

(b) *Substations.*

Aongatete.—Metering-equipments were installed in connection with supply to Tauranga Power Board and Tauranga Borough Council respectively.

Belmont.—A start was made in February, 1941, on the construction of a 10,000 kVA. 50/11 kV. substation as a fourth supply point for the Waitemata Electric-power Board.

Bombay.—New 11 kV. switchgear consisting of a ten-panel, metal-enclosed, unit-type switchboard was put into service in place of the existing switchgear.

Hamilton.—A start was made in January, 1941, on extensions to and the rebuilding of the 110 kV. structure for a second 10,000 kVA. transformer bank and additional transmission-lines. A new relay-house was completed in January. A new radio transmitting and receiving set was temporarily installed and put into service in March, 1941, for the use of the System Load Despatcher.

Henderson.—The old 50 kV. steel structure was replaced by a new one, portion of the old structure being re-erected at Karapiro. Two new 3,000 kVA. transformer banks were installed, replacing the two 1,000 kVA. three-phase transformers. The erection of a new transformer house was practically completed by the end of the year. A new 11 kV. feeder O.C.B. was installed in September.

Kaikohe.—The substation buildings and three cottages were completed in September. A 50 kV. lightning-arrester from Takapuna was installed in December.

Kaitaia.—A temporary 750 kVA. 50/11 kV. substation was put into service as a second point of supply for the Bay of Islands Electric-power Board on 1st July, 1940. A 50 kV. lightning-arrester from Takapuna was installed in December. The substation buildings and two cottages are practically completed.

Lichfield.—A temporary 1,000 kVA. substation was put into service as an additional supply point for the Thames Valley Electric-power Board.

Maungatapere.—Three new cottages and two private garages were completed in November.

Mount Roskill.—A start was made on the substation buildings in June.

Ngongotaha.—A 1,000 kVA. three-phase transformer was installed in parallel with the existing banks.

Ongarue.—Work was commenced in February on the erection of a 110 kV. steel structure to replace the existing wood-pole structure. Two new cottages are being built.

Penrose.—The installation of a second synchronous condenser was completed, the 20,000 kVA. machine being put into service at the end of May, 1940. A 10,000 kVA., 110/50 kV. bank of transformers was put into service on supply to the North Auckland area on 25th October, 1940. Work is proceeding on extensions of the control-room and 110 kV. structure.

Takapuna.—The original steel structure has been by-passed and dismantled in readiness for transfer to Kaitaia, and a new steel structure is in the course of erection.

(c) *Transmission and Distribution Lines.*

Arapuni–Penrose 110 kV. Tower-line No. 2.—Construction was completed in September with the exception of the wiring of the terminal spans, which is held up pending the completion of the 110 kV. terminal structure at Penrose.

Penrose–Henderson 110 kV. Tower-line.—Construction was commenced in May, and was completed in April, 1941. Survey and pegging was completed for the supervisory and control circuits from Penrose to Mount Roskill.

Arapuni–Bunnythorpe 110 kV. Tower-line (Arapuni–Mangaturuturu Section).—Final pegging of the Arapuni–Ongarue section has been completed. Tower erection was commenced on the Ongarue–Mangaturuturu section in May, and by the end of March 112 towers had been erected, leaving 56 to complete.

Karapiro–Hamilton 110 kV. Tower-line.—Final pegging of tower positions was completed.

Hamilton–Waihou 110 kV. Line.—Survey work was commenced in February, 1941.

Henderson–Takapuna 50 kV. Line.—A survey was made of a deviation to eliminate the harbour crossing near Hobsonville Air Base, following which a decision was made to rebuild the whole line using heavier conductors. Plans and profiles have been completed.

Takapuna–Belmont 50 kV. Tower-line.—Plans and schedules have been completed. The towers for this line will be obtained from the existing Penrose–Henderson 50 kV. line, which is to be dismantled.

Kaikohe–Kaitaia 50 kV. Line.—Construction was completed, and the line was livened on 30th June, 1940.

Bombay–Waiuku 50 kV. Line.—Possible routes were inspected, line costs estimated, and materials ordered.

Edgecumbe – Te Puke 50 kV. Line.—Detail survey was commenced in March, 1941.

Te Puke – Aongatete.—An exploratory survey was made in February to fix the location of a proposed line.

(2) OPERATION AND MAINTENANCE.

(a) POWER-STATIONS.

Arapuni.—Four 50 kV. O.C.B.'s and two 110 kV. O.C.B.'s were overhauled, new bushings, contacts, and explosion pots being fitted. The bushings on Nos. 7 and 8 transformer banks were fitted with new caps designed to relieve the joints of thermal stresses. The low-pressure coils on two of the original 11/110 kV. transformers were burned out.

Air-conditioning plant was installed in the control-room.

Work was carried out by the General Branch over the greater part of the year on dragging operations to lower the level of the tail-race.

Horahora.—The station was run to full capacity throughout the year, giving very satisfactory service.

Penrose Diesel Plant.—The two units available for service were run five days a week during the winter months, and at such other times as required. Flashovers occurred in the 6·6 kV. O.C.B.'s of these units in January, causing some damage.

Huntly Steam Plant.—A start was made in May on the recommissioning of this station to enable supply to be given if and when required. The plant was given a trial run in September, and was then shut down and left available for use in emergency. Preparations were made in March, 1941, for the regular operation of the station, and supply was commenced in April.

(b) SUBSTATIONS.

(i) *110 kV.*

Penrose.—An external water-cooling system was installed on the 22/50 kV. banks of transformers to reduce the temperature pending the installation of additional transformer capacity. New windings were fitted to the unit which was damaged by lightning on 12th June, 1939. All H.T. bushings in a 110/22 kV. bank were rejointed on account of oil leaks. Temporary by-pass lines are being erected to connect up the new Penrose–Henderson 110 kV. line to the east and west 50 kV. circuits.

Bombay.—A large amount of work was carried out on levelling, turfing, and drainlaying about the H.T. enclosure. The automatic T.C.O.L. equipment on the 50/11 kV. banks of transformers was put into service in December.

Hamilton.—A flashover occurred in a tank of an 110 kV. O.C.B. due to moisture gaining entry through defective jointing-material. Six defective insulators were replaced on the 50 kV. structure. Water-mains were laid for three hydrant plugs for fire-fighting purposes, and three 1 in. hose reels were installed.

Ongarue.—Three 110 kV. fuses were shattered by lightning. The 750 kVA. transformer that was damaged by lightning on 30th July, 1939, has been fitted with a new H.T. winding.

(ii) *50 kV.*

Hangatiki.—A new relay system was fitted to the 11 kV. feeder switch. All insulators on the 50 kV. line A.B.S. were replaced.

Henderson.—A flashover on a 50 kV. isolator was caused by nesting-material carried by a bird. The structure has been made bird-proof with netting, as far as possible.

Huntly.—A 7½ ton chain block was fitted to the gantry in place of a 4 ton block. A cable-box breakdown due to moisture occurred.

Kaikohe.—The 11 kV. cubicle switch was damaged by a flashover caused by a bird on 15th January, 1941, and two 250 kVA. transformers in the 50/11 kV. bank were burned out at the same time.

Kaitaia.—Two H.T. bushings on the 50/11 kV. bank were shattered and others were chipped by a flashover caused by lightning on 6th November, 1940. Burnouts occurred in two of the 250 kVA. transformers on 17th March, 1941, when the 11 kV. cubicle switch failed to clear a feeder fault. Oil-storage tanks were installed and a temporary store was built.

Karapiro.—A breakdown of a 50 kV. string of insulators occurred shortly after the substation had been livened on 26th October, 1940. Three defective 50 kV. insulators were replaced.

Kerepeehi.—The oil in the 11 kV. cable end-boxes on the main transformers was replaced by compound, as the oil had been finding its way into the booster transformer cubicle. An outage was caused by faulty operation of the booster transformer in June. Ten cracked 50 kV. insulators were replaced.

Lichfield.—Trouble was experienced with the 11 kV. cubicle switch in July, due to faulty adjustment. A breakdown of the 11 kV. trifurcating box on the 1,000 kVA. three-phase transformer occurred in December.

Mamaku.—A 50 kV. fuse blew in December. The cause is not known.

Mareretu.—The 50 kV. line O.C.B. was transferred to Maungatapere in March, 1941.

Matamata.—Following faulty operation of the booster transformer in April, 1940, it was found that a large number of screws and bolts had worked loose. An inspection of similar units at other substations showed that screws and bolts had worked loose on these also.

Maungatapere.—Flashovers on Nos. 2 and 3 11 kV. O.C.B.'s were caused by lightning on 1st October, 1940. Further trouble was experienced with damaged bushings on O.C.B. 3 and in the bus chamber. New bus chambers for O.C.B.'s 2 and 3 were installed in December.

Ngongotaha.—A bank of transformers was forwarded to Claudelands for repairs to defective L.T. leads. However, owing to transformer breakdowns at Kaikohe and Kaitaia it was necessary to forward some of these units for use as replacements. Two defective 50 kV. insulators were replaced. A new storeroom was built.

Takapuna.—The two 50 kV. lightning-arresters were removed to enable work to proceed on the new 50 kV. steel structure and were transferred to Kaikohe and Kaitaia in December. New arresters will later be installed at Takapuna.

Te Awamutu.—Six defective 50 kV. insulators were replaced.

Waikino.—Two 11 kV. C.T. failures occurred in November, two in December, and one in January.

Waiotahi.—A 50 kV. post-type insulator broke down on 14th November, 1940. A pump was installed in September, to provide auxiliary water-supply for the cottages.

Tahekeroa and Waihou.—Routine operating and maintenance duties were carried out.

Edgecumbe.—Two 11 kV. bushings on the booster transformer were damaged by a flashover caused by a cat. A cracked 50 kV. post insulator unit was replaced.

(iii) *11 kV.*

No trouble was experienced at these substations during the year. Regular inspections were made and equipment was found in good order.

(c) TRANSMISSION AND DISTRIBUTION LINES.

(i) *110 kV.*

Arapuni–Penrose.—Sags were checked by the return-wave method. The 19/·092 conductors of lines 3 and 4 in the span across the head-race at Arapuni were replaced by 19/·101 conductors. The legs on a large number of towers were inspected for signs of rusting below the ground-line; traces of rust were found on a few legs, and these were cleaned and painted, whilst in some cases the legs were also concreted in. Outages of lines 4 and 5 were caused by lightning on 14th December, 1940. Warning notices were distributed to farmers along the route of this line. The telephone-line was deviated at Karapiro to avoid the village-site. Two 25-ft. telephone-poles broke off at the ground-line during the year due to decay.

Arapuni–Stratford.—Considerable work was done on the clearing of access tracks and firebreaks. A 400 lb. lead-filled weight was dislodged from its suspension clamp in July due to the lead being forced out of the bucket by water collecting inside the bucket and freezing. To prevent this, drain holes are being drilled in the cast iron buckets of this type of weight on all lines. An outage occurred during a thunderstorm on 1st October, 1940. A large number of defective rata crossarms on the telephone-line were replaced. The linemen's bach at Rangitoto has been shifted to Hangatiki.

Arapuni–Edgecumbe.—The line is still being operated at 50 kV. Pole tops were fitted with metal caps. An outage was caused on 17th June, 1940, by a flashover when a fencing-wire was being strained up beneath the line.

(ii) *50 kV.*

Penrose–Takapuna.—Six insulators were replaced on account of cracks caused apparently by corrosion due to salt spray where the pin enters the insulator thimble. Warning lights were erected on towers in the vicinity of the Air Base at Hobsonville. Outages of the Henderson–Takapuna section occurred on 4th February (cause unknown), 12th February (caused by a haystacker), and 12th March (caused by a gorse fire).

Henderson and Maungatapere.—The telephone hut at structure 645 (Tauraroa) was shifted to structure 678 (Maungakaramea), and a new hut was installed at pole 566.

Maungatapere–Kaitaia.—A bach was built at Mangamuka and a telephone installed. A flashover was caused by a tree on 8th July, 1940, during felling operations.

Bombay–Waikino.—Lightning caused an outage of the Bombay-Kerepeehi section on 15th December, 1940, and of the Kerepeehi–Waikino section on 14th December, 1940. An outage of the whole line occurred on 9th August, 1940, but nothing was found to account for the tripping.

Waikino–Aongatete.—Outages were caused on 9th October, 14th December, and 15th and 20th March by lightning; on 1st and 4th January due to cause unknown; on 24th January by the failure of an insulator; on 19th February by trouble on McLarens Falls system; on 20th February by a scrub fire; and on 7th, 12th, 14th, and 21st March by trouble on the Power Board system.

Horahora–Matamata–Waihou.—Both sections tripped out during a thunderstorm on 18th March, 1941.

Horahora–Hamilton.—Outages were caused by lightning on 1st October and 14th December. A tap line was run to Karapiro Substation in October. All Coutts connectors on the telephone-line have been removed and the joints remade and soldered.

Hamilton–Huntly.—An outage was caused by the failure of an insulator on 13th December.

Te Awamutu – Hangatiki.—Two outages occurred, one on 28th April, 1940, when the line was accidentally earthed, and the other on 7th November, 1940, during a thunderstorm.

Ngongotaha–Edgecumbe.—A telephone-wire in the sulphur area broke, due to corrosion. Both wires were renewed in spans 158 to 162.

Edgecumbe–Waiotahi.—An outage occurred during a thunderstorm on 6th May.

Arapuni–Ngongotaha and Waihou–Paeroa.—The usual patrol and maintenance duties were carried out on each line.

(iii) *11 kV.*

Horahora–Hautapu.—An 11 kV. lightning-arrester broke down at Hautapu on 21st August, 1940.

Hamilton–Frankton.—An outage was caused on 7th April, 1940, by a piece of fencing-wire being thrown over the line, and on 23rd November, 1940, and 31st December, 1940, by insulator failures on the 11 kV. change-over A.B.S. at the New Zealand Railway substation.

Waikino–Waihi.—Corroded steelwork on towers was replaced by reconditioned parts taken from the dismantled Waiorongomai–Waikino 50 kV. tower-line.

Grand Junction Tap.—The work of dismantling this line was completed in August.

Arapuni Village.—Considerable time was spent on alterations to old service lines and dismantling of old poles.

Ongarue–Manunui.—A set of lightning-arresters was installed at Taumarunui.

(iv) *General.*

Line-maintenance.—Routine work was carried out on the various lines according to schedule, including the live-line testing of insulators on 110 kV. and 50 kV. lines and the testing of poles by boring.

Insulator Replacements.—The results of insulator testing or inspection are as follows:—

——	110 kV. Units.	50 kV. Units.	50 kV. Pin.	Totals.
Number tested	61,434	13,769	15,687	90,890
Number defective by test..	4	2	212	218
Number defective by inspection	2	..	66	68
Total number defective	6	2	278	286
Percentage defective	0·017	0·023	1·772	0·315

Twenty insulators were replaced under live-line conditions. In addition to the above replacements, four defective insulators on 11 kV. lines also were replaced.

Pole Replacements.—Forty-seven defective poles were replaced during the year, the total being made up of eight 52 ft. poles on 110 kV. lines, one 38 ft. and two 42 ft. poles on 50 kV. lines, four 35 ft. poles on 11 kV. lines, and one 52 ft., one 35 ft., and twenty-nine 25 ft. poles on telephone lines. Two 25 ft. poles broke off at the ground-line, and replacements of the balance were mainly on account of decayed heartwood.

(*d*) TESTING.

Routine tests were made on meters, relays, instruments, &c., throughout the district, installation tests on new equipment at the various substations—Hipot tests on all 110 kV. and 50 kV. bushings, resistance tests on stator windings at Arapuni, and tests on new distance relays and on other relays. All telephone connections were checked and the system diagram brought up to date. Incorrect relay operations were investigated, and insulators were tested on the H.T. set.

(e) GENERAL.

Troubles on System.—The following is an analysis of troubles experienced on the Department's system in the last three years :—

Ref.	Description.	Year ending 31st March,		
		1939.	1940.	1941.
	6·6 or 11 kV. lines—			
1	Defects ..	3	1	2
2	External causes ..	..	2	1
	33, 50, or 66 kV. lines—			
3	Defects ..	10	7	2
4	External causes ..	3	4	5
	110 kV. lines—			
5	Defects ..	3	..	..
6	External causes ..	..	3	..
7	Lightning ..	6	14	20
8	Storms : Nature of trouble not discovered	..	..	..
9	5, 6·6, 11, or 22 kV. apparatus	6	13	15
10	33, 50, or 66 kV. apparatus ..	8	5	6
11	110 kV. apparatus ..	2	2	2
12	Generators or synchronous condensers ..	1	1	..
13	Relays ..	1	5	3
14	Control circuits and batteries	..	2	..
15	Operation : Mistakes	8	4	4
16	Operation : Accidents	2	2	1
17	Other causes	4	1	9
18	Cause unknown or fault not located	2	4	9
	Totals ..	59	70	79

Circuit miles of lines in operation at 31st March, 1941 : 11 kV., 75·41 ; 50 kV., 500·73 ; 110 kV., 491·92.

Number of substations in service at 31st March, 1941 : 11 kV., 3 ; 50 kV., 20 ; 110 kV., 4.

Numbers of consumers : Bulk, 16 ; wholesale, 6.

Chateau Tongariro.—Worn deflectors on the lower deflector shaft were replaced in December, assisting in improved turbine operation.

B. PALMERSTON NORTH DISTRICT.

(1) CONSTRUCTION.

(a) POWER-STATIONS.

Mangahao Power-house and Headworks.—The site has been prepared, access road completed, and water-supply arranged for two cottages and a three-stall garage at Mangahao No. 1 dam. Tenders have been called for the erection of these buildings.

Two 3,000 kVA. regulators for the Horowhenua Power Board supply were unfortunately lost at sea. A repeat order has been placed.

Waikaremoana Power-house and Headworks.—A building was erected to house the gate controls and telephone at the surge-chamber, and extra accommodation for the military guard has been provided at Kaitawa. A new 11 kV. O.C.B. for the Onepoto line was installed. Supplies of new steelwork, O.C.B.s, A.B.S.s, &c., for ten new bays of 110 kV. switchgear and one 50 kV. bay are slowly coming to hand.

The 110/50 kV. transformer bank arrived during the year, but was temporarily diverted for use in the Hamilton district. This bank will be returned to Tuai about September, 1941.

The erection of the new power-house at Piripaua and headworks, under the direction of the General Branch, is progressing steadily.

(b) SUBSTATIONS.

Bunnythorpe.—Two five-roomed cottages and a two-stall garage should be completed by the end of April.

The A.B.S. for the Bunnythorpe–Ongarue line has been erected.

During the year seven 2·5 mVA. tap-changing on load transformers were placed in service. They have replaced a 4·5 mVA. bank transferred to Marton and a 4·5 mVA. bank transferred to Hawera. Tenders have already been called for the supply of two 10 mVA. banks to replace the above. Tenders have also been called for a 25-ton electrically-operated crane, and an order has been placed for a 50 kVA. local service transformer ; gang-operated 110 kV. isolators have also been ordered.

Dannevirke.—Bus-bars have been erected in Bay E and the erection of a single stall garage completed.

Greytown.—The structure and switchgear for a temporary substation at Greytown is in course of erection and a metering cubicle has been installed. Transformer for this substation has been transferred from Marton.

Gisborne.—Temporary structure for a second transformer bank ex Hamilton has been erected, and transformers have been placed in position.

Hawera.—The conversion of a four-roomed cottage to a five-roomed cottage has been completed. The extension to the traverser track and alteration of existing transformer pads is under way. The 4·5 mVA. transformer bank ex Bunnythorpe has been overhauled, and drying out is proceeding.

Khandallah.—Operating-boxes for transformer bank O.C.B.s were received and the wiring of O.C.B.s completed. All new switchgear is now in operation. A high-tension switchgear control panel was received and connected up, and transformer O.C.B. relay panel also erected.

Mangamaire.—Erection of switchgear in new transformer bay completed.

Marton.—Tower pads, transformer pads, and traverser track have been installed during the year. Portion of structure and new switchgear erected, also two 2,000 gallon oil-tanks. The 4·5 mVA. bank of transformers ex Bunnythorpe and new cable were installed, and the previous 1,500 kVA. transformer transferred to Featherston, together with old switchgear.

Masterton.—A third new 110 kV. line O.C.B. was installed, and the installation of the others completed and all control cables run.

Mataroa.—The erection of two five-roomed cottages, single men's quarters, and a five-stall garage is nearing completion. Erection of substation structure has been delayed through non-arrival of steelwork.

Melling.—Second cottage and garage completed. Extensions to switchroom under way. Installation of O.C.B.s completed and new 10 mVA. T.C.O.L. bank of transformers installed. The installation of two new Railway 11 kV. feeders is in progress.

Napier.—New line bay of steelwork and switchgear completed. Oil and 11 kV. cable now stored at substation.

New Plymouth.—New 7·5 mVA. T.C.O.L. transformer bank received is now in service, replacing 2,250 kVA. bank destined for Te Kiri. Double 0·4 11 kV. cables were installed on the new bank to meet Borough Council's requirements. Two 2,000 gallon oil-tanks installed.

Ohakune.—Four cottages, single men's quarters, and three two-stall garages have been completed. This substation is in a similar position to Mataroa with respect to steelwork.

Paraparaumu.—Two 2,000 gallon oil-tanks have been received. A third cottage and single-stall garage erected.

Stratford.—Traverser track extended, turn-table installed, and 50/33/11 kV. structures erected. 10 mVA. 110/50 kV. T.C.O.L. transformer bank and 5 mVA. 50/33/11 kV. auto transformer bank placed on pads. The 50 kV. O.C.B.s (six in number) have arrived, and advice of shipment for control panels has been received.

Te Kiri.—The site for a new 50 kV. substation of 2,250 kVA. capacity has been selected, surveyed, and the land proclaimed.

Waipawa.—Single-stall private garage and erection of new switchgear completed.

Wairoa.—Site for new substation selected, surveyed, and proclaimed.

Woodville.—Two 2,000 gallon oil-tanks installed. A.B.S. and switch fuse for transformer supply erected. Conduits and conductors for services and controls installed in the new switch-room. Earthing-switch for new Napier line erected and substation fence extended.

(c) TRANSMISSION-LINES.

The circuit-miles of transmission-lines and number of substations in operation are as follow :—

Voltage.	Circuit-miles of Transmission.	Number of Substations.
110 kV.	628·16	14
50 kV.	107·00	3
11 kV.	32·19	1

(i) *110 kV. Lines.*

Woodville–Featherston.—The fitting of armour rods and new strain clamps on this line has been completed.

Woodville–Napier Duplication.—Pole-erection was completed in February. Wiring at present in progress.

Bunnythorpe–Ongarue.—All supports except at substation have been erected, and wiring in progress.

Tuai–Piripaua.—Erection of this line has been started.

(ii) *50 kV. Lines.*

Stratford – Te Kiri.—Surveys completed, material ordered, and with the exception of about twenty poles all requirements are now in New Zealand.

(iii) *11 kV. Lines.*

Tuai – Settlers Lines.—11 kV. Lines—namely, Tuai–Jessop, Jessop Extension; and Piripaua–Tapper—have been completed, transformers erected, and supply effected.

Palmerston North.—Extension to garage workshop and blacksmith's shop completed.

(2) OPERATION AND MAINTENANCE.

(a) POWER-STATIONS.

Waikaremoana.

Power-house.—No. 2 machine developed a fault, damaging six coils—repairs effected; three shifts worked during repairs.

No. 3 unit rotary valve was overhauled and repaired under the supervision of the manufacturer's engineer. New oil-rings fitted to main bearing and roller guides for same.

No. 1 machine was subjected to a major overhaul during the year.

All 110 kV. bushings of a particular make were reconditioned and fitted with new-type caps.

Extra fire-hydrants installed in power-station, and fire barriers erected between power cables in cable basement and tunnel.

Faulty 110 kV. bushing on No. 14 O.C.B. replaced and several 110 kV. bushings reconditioned.

New station battery installed.

Village reticulation altered to suit site for new store, and improvements effected to the new social hall.

Mangahao.

Headworks.—Five heavy slips and several smaller slips on roads to dams occasioned a good deal of damage, extensive repairs, and remetalling.

The wire ropes which operate the gate-roller cages of No. 1 tunnel gate corroded through and were renewed.

Shutdown took place as opportunity offered in order to inspect and effect necessary repairs on Nos. 1 and 2 tunnel gates, surge-chamber, and pipe-lines.

At the surge-chamber the gates were pulled away from the frames, thoroughly cleaned, and three coats of tar paint applied.

The tunnel gates were very good as far as tightness was concerned, but adjustments were required on the tightening strips of the bypass-tunnel gates.

All preparations have been made for cleaning and painting interior of pipes between surge-chamber and No. 1 anchor block, and this work is now in progress.

The total rainfall for the year was as follows: No. 1 dam, 120·10 in.; No. 2 dam, 104·77 in.; No. 3 dam, 78·17 in.; power-house, 39·69 in.

Power-house.—A fault to earth on "B" and a flashover on "A" Horowhenua regulators were experienced—repairs effected.

Control board rewiring has been carried on intermittently and fair progress has been made.

(b) SUBSTATIONS.

Gisborne.—During the course of repairs due to a broken post insulator on O.C.B., an accident occurred resulting in the death of one man and injury to another.

New C.T.s were installed on Te Karaka, Ngatapa, and Waimata feeders.

Preparations are complete for installation of temporary second bank of transformers ex Hamilton.

Khandallah.—Synchronous condenser: Broken field connector on rotor required renewal.

An earthing-switch was found to be inoperative, due to galvanized pins seizing on brass hinge-blocks. These pins now replaced with brass ones.

Mangamaire.—Birds-nests in snowhoods of A.B.S.s required removal.

One interruption was caused by short-circuit on transformer H.T. windings.

Masterton.—One H.T. bushing failed on No. 1 transformer.

A faulty C.T. in the Kourarau panel caused a fire, resulting in considerable damage. Trouble in summation panel was caused by hot joints in plug contacts.

Marton.—Capacity increased from 1·5 mVA. to 4·5 mVA. Damaged 11 kV. bushings replaced.

Melling.—Capacity increased by installation of 10 mVA. transformer bank.

Napier.—Post insulators replaced where required.

Three-core cable to west bank of transformers was isolated and a three-phase aerial run to supply incoming panel.

New Plymouth.—Alterations made to traverser-truck wheels to enable use on rails inside workshop.

Repairs effected to cable sealing end-boxes.

Stratford.—11 kV. bus slightly damaged by fire. Insulation increased.

Woodville.—Reticulation altered to suit new control-room supply—three new poles erected.

General.—Duties regularly attended to; in particular, oil tests, oil filtering, and O.C.B. inspections.

(c) TRANSMISSION-LINES AND ASSOCIATED TELEPHONE-LINES.

(i) *110 kV.*

All lines were regularly patrolled. Pole-to-pole inspections were completed and overhaul attended to. Insulators were tested throughout and defective insulators replaced. One pole (No.571) on the Woodville–Masterton line was shattered by a lightning stroke and was renewed. Track maintenance has been heavy in some sections. Several weights have had to be replaced, due to broken hooks. Woodville–Masterton section was reinsulated to modern standard.

Defective telephone-poles have been replaced as follows: Mangahao–Bunnythorpe section, 6; Bunnythorpe–Wanganui section, 1; Bunnythorpe–Woodville section, 2; Woodville–Masterton section, 3; Woodville–Napier section, 13; Napier–Tuai section, 4. Necessary repairs have been effected as required, and huts throughout inspected and reconditioned where required.

(ii) *50 kV. Lines.*

Regularly patrolled—pole-to-pole inspection completed. Insulators tested throughout and defectives replaced. Service good. Deviation made on Tuai-Wairoa line where Tuai–Piripaua 110 kV intersects.

(iii) *General.*

(1) *Khandallah High-tension Testing-set.*—The main use to which this set has been applied has been the retesting of insulators found defective in live-line testing.

A series of tests on insulators of local and British manufacture was also carried out for one supply authority.

Sample insulators were also subjected to the thermo-cycle test to British Standard Specification.

(2) *Communication System.*—The test department has carried out regular tests and inspection of high-tension telephone equipment at power-stations and substations.

Work is at present being carried out on the construction of a new telephone-line between Bunnythorpe and Ongarue. This, when complete, will give direct low-tension communication with Arapuni.

New telephones are being installed in the signalling system.

The standardization of telephone and alarm circuit apparatus at all substations is still proceeding.

(3) *Test Department.*—All requisite maintenance tests were conducted throughout the year on revenue and demand metering equipment, indicating and recording instruments, relays, batteries, and battery-charging equipment at both power-stations and all substations.

A considerable amount of testing and repair work, involving recoverable charges, was carried out for various consumers.

Owing to growth of load, larger current transformers have been installed at several substations and a periodical survey of load conditions made.

The routine six-monthly megger tests, made by the field staffs, on all system apparatus were graphed and analysed, and further action taken where necessary. "Hipot" stick tests were made on all high-tension bushings at Bunnythorpe, Dannevirke, Khandallah, Marton, Mangahao, Masterton, New Plymouth, and Woodville. The "Hipot" tester was available for a short period only.

Tests on the second new bank of transformers for Bunnythorpe revealed a faulty joint between the two halves of the high-tension winding—repairs effected. Tests carried out and assistance given in restoring supply at Masterton when trouble experienced (*a*) on transformer, (*b*) on 11 kV. switchgear.

Deterioration in lightning-arresters was investigated and consideration given to the feasibility of effecting repairs locally.

Transformer relay and control panels for Melling are at present under construction, those for Khandallah being completed during the year.

Maintenance repairs on printometers, contactors, meters, relays, fuses, and various instruments, involving subsequent tests and recalibrations, have been conducted systematically, and all equipment maintained in good condition.

(4) *Reliability of Supply.*—Thirty-nine faults, seven of which caused no interruption, were experienced on the Department's system for the year. In the following comparative table for the last four years the reference number and description of fault is used in subsequent details:—

Analysis of Troubles on Department's System for the Four Years ended 31st March, 1941.

Ref.	Description.	Year ended 31st March.			
		1938.	1939.	1940.	1941.
	6·6 or 11 kV. line—				
1	Defects	..	..	1	2
2	External causes	..	..	5	2
	33, 50, or 66 kV. line—				
3	Defects	1	3	..	..
4	External causes	..	1	1	..
	110 kV. line—				
5	Defects	..	..	..	..
6	External causes	2	4	4	1
7	Lightning	7	8	10	8
8	Storms: Nature of trouble not discovered	..	4	2	1
9	6·6, 11, or 22 kV. apparatus	3	1	5	4
10	33, 50, or 66 kV. apparatus	1	1	1	..
11	110 kV. apparatus	6	2	2	4
12	Generators or synchronous condensers	..	..	..	..
13	Relays	4	1	..	3
14	Control circuits and batteries	1	..	..	1
15	Operation mistakes	4	7	3	5
16	Operation accidents	1	1	..	1
17	Other causes	8	17	14	4
18	Cause unknown	2	4	8	3
	Totals	40	54	56	39

The following interruptions occurred to the Department's supply to consumers :—

Consumer.	Point of Supply.	Number.	Total Duration.	
			Hrs.	Min.
(a) Interruptions due to Faults on Consumers' Systems.				
Hutt Valley Electric-power Board	Khandallah	5	0	53
,,	Melling	2	0	6
New Plymouth Borough Council	Stratford	7	4	15
Poverty Bay Electric-power Board	Gisborne	3	0	9
Taranaki Electric-power Board	Stratford	8	0	58
Wanganui-Rangitikei Electric-power Board	Marton	1	1	58
Wairoa Electric-power Board	Wairoa	2	0	2
Wellington City Council	Khandallah	5	0	25
(b) Pre-arranged Interruptions at Consumers' Requests.				
New Zealand Railways Workshops	Khandallah	2	9	11

SOUTH ISLAND ELECTRIC-POWER SYSTEM.

INTRODUCTORY.

The year ended 31st March, 1941, was the twenty-sixth year of operation of the Lake Coleridge undertaking, and the sixth complete year of operation of the Waitaki Scheme. It also represented the third year of operation since taking over the Arnold River Scheme and the fifth year since taking over the Monowai Scheme.

During the year the Lake Coleridge and Waitaki Stations operated in parallel satisfactorily with Waipori and Monowai as required. Lake Coleridge and Waitaki were separated on five occasions, the duration of separation varying from 59 minutes to 10 hours 59 minutes.

Monowai has normally run in parallel with the main system, but there have been several occasions when the system split, generally for the purpose of line overhaul work and reconstruction work at Winton and Invercargill Substations.

At Arnold operation has been normal and the station has functioned at full output except for one occasion when there was insufficient water for more than two-thirds of the plant-capacity.

The Dobson Diesel Station was called upon on occasions when the main lines went out of operation and also for peak-load conditions during the dry spell in the June–September quarter.

1. Capital Outlay.

The capital outlay at 31st March was £7,289,053, of which assets to the value of £300,473 were not in operation.

2. Financial Results.

The total revenue for the year was £678,813 and working-expenses totalled £173,288, making a gross profit of £505,524, which equals a return of 8·59 per cent. on the average capital outlay in operation.

The interest-charge for the year was £254,070, which together with depreciation £73,711, was met from revenue, leaving an amount of £126,227 available for the sinking fund this year, after paying £51,516 for income-tax, &c. The sinking fund account was £214,654 in arrears at the end of the year.

The accumulated reserves and sinking funds at the 31st March, 1941, amounted to £1,443,910.

Table I gives full particulars of the financial results and also statistical returns of operations for the year.

3. General.

The total units generated (including supply from Dobson Diesel Station) and purchased were 419,883,195, representing an increase of 13·58 per cent. on those of last year. Of these units, 328,971,478 were sold by Christchurch District and 29,470,875 by Southland District, while 2,907,865 were otherwise accounted for. The balance of 58,532,977 units represents transmission and distribution losses, and amounted to 13·94 per cent. of the units generated.

The maximum system load increased from 76,160 kW. to 84,920 kW., an increase of 11·50 per cent. The average system load factor was 56·44 per cent.

4. Construction, Operation, and Maintenance.

A. CHRISTCHURCH DISTRICT.

(1) Construction.

(a) *Power-stations.*

Lake Coleridge.—Accommodation was erected for a military guard. A 50 kVA. transformer was installed and reticulation rearranged.

Waitaki.—The erection and drying-out of No. 3 unit was completed and, after trials, was finally placed on load in December, 1940, and has supplied 36,375,880 units to the system.

The assembly and erection of No. 4 unit, with its attendant gear, is nearing completion.

Headgate-frames, winches, and screens were assembled and ercted for Nos. 3, 4, and 5 units.

The drain-valves of Nos. 3, 4, and 5 suction tubes have been redesigned so that retractable operating spindles can be used.

Soundings and levels were taken on the tail-race side of the dam.

(b) *Substations.*

At Addington the installation of the first 20,000 kVA. 66/11 kV. transformer-bank and the 5,000 kVA. 66/33 kV. bank was completed in May, 1940. The second 20,000 kVA. bank was completed in March, 1941.

At Timaru one double garage, two single garages, and two tool-sheds were erected.

A four-stall garage was erected and sixty insulators on the outdoor structure were replaced at Glenavy.

A four-stall garage and four tool-sheds were erected. One 110 kV. transformer bushing was replaced after failure, the spare transformer was reinstalled and energized after repairs at Oamaru Substation.

At Half-way Bush a clay bank was excavated and area levelled for lawn, and a shelter-belt of pine-trees planted. At Hororata Substation a 1,000 kVA. transformer-bank was installed and put into service in November, 1940.

At Ashburton the 25 kVA. local service transformer was replaced with a 50 kVA.

At Harewood a new 33/11 kV. substation was erected, including building, transformers, and switchgear.

Four cottages and garages were erected at Otira Substation, and good progress was made with the erection of outdoor structure, the O.C.B.s and transformers being assembled and in place.

(c) *Transmission-lines.*

The construction of a new 110 kV. line to replace the Ashburton–Timaru " A " line and the overhaul of Ashburton–Timaru " B " line is progressing satisfactorily, the work being finished between Ashburton and Temuka River.

For construction purposes at Highbank a 6.6 kV. line one mile long was erected to take supply from Ashburton Power Board. Low-tension reticulation and wiring of buildings also carried out.

On the Waitaki–Glenavy 110 kV. line tower No. 20 was transferred to a piled foundation on account of erosion of river-bank.

The 90-chain deviation of the Otira–Arahura 66 kV. lines was completed and went into service in April, 1940.

A length of 1 mile 28 chains of 11 kV. line was built for the Kanieri Gold-dredging Co.

The 11 kV. double-circuit line from Otira to the Tunnel Substation was advanced by completion of tunnel-end section.

Two new 11 kV. 0·2 square inch cables were run and connected up between Addington and Milton Street.

Steelworks and Southern 11 kV. feeders were reconstructed.

A new 11 kV. 0·06 square inch cable was run from Addington to Foster Street Substation for supply to Riccarton Borough Council.

At Hanmer the supply was changed over from D.C. to A.C. and is now ready for new transformers and underground reticulation. Wiring in buildings was overhauled.

The reconstruction of Lake Coleridge – Hororata " B " and " C " lines on towers between Sleeman's Road and Hororata, and the reconstruction of the old " C " line as part of the Hororata–Highbank line was completed. The remainder of the Highbank line, with the exception of the Rakaia River crossing was also completed.

The route of the new 110 kV. Ashburton–Timaru line was surveyed and pegged, and the survey of Timaru–Tekapo line was completed.

(d) *Telephone System.*

To connect up with the Post and Telegraph system at Methven one mile of telephone-line was run from Highbank.

(e) *Test Department.*

In addition to routine testing a considerable amount of testing and repair work, including recoverable charges, was carried out for Defence, Air, and Post and Telegraph Departments, as well as for other consumers.

(2) OPERATION AND MAINTENANCE.

(a) *Power-stations.*

Lake Coleridge Power-station.—The main part of the work carried out at the Harper consisted of making good the damage done by the flood in February, 1940.

The outer end of the main diversion groyne was reconstructed and a wide apron placed on north side and east end of groyne and a crust of concrete run over aprons to protect netting. This work was completed in September, and early in October a severe flood caused the river to change its course again and strike into the outer end of the new construction.

The gap cut in the Long Groyne was closed and some 230 ft. of 5 ft. wide apron was placed.

In May, 1940, exceptionally heavy rain (nearly 10 in. fell in three days at Lake Homestead) resulted in the Harper Road being submerged to a depth of several feet east of Lake Georgiana. A temporary road was constructed. During this period the lake-level rose to 1,672·95 ft., the highest recorded.

It was not until the middle of July that the Lake fell below overflow, but after then the decline was fast and the minimum level of 1,666·23 ft. was reached by 27th September. Rapid recovery took place and the level at 31st March, 1941, was 1,672·15 ft.

Owing to the failure of a concrete weir endangering the bridge on the Harper Road the Acheron diversion was closed on 1st November, 1940, and has not yet been reopened.

The usual scooping and trucking work at the intake was continued.

Exterior of all pipe-lines were scraped and painted when necessary.

Erosion round relief-valve seating of No. 2 unit was repaired by welding. Balance cylinder of relief valve was replaced. On 18th November, 1940, this unit was shut down for replacement of governor-relief valve, &c. To date the governor has been set in place, relief-valve discharge welded to original discharge pipe, and work advanced as far as possible pending return of main-valve body, which is being welded and machined.

Vents with hinged covers were cut in air-inlet ducts for Nos. 1, 2, and 3 units to allow air to be drawn from basement when required.

Nos. 4 and 5 sluice-gates were provided with new bronze seating-rings.

During August vibration was noticed in No. 5 unit, and the trouble was found due to shingle becoming wedged in gates, causing the fracture of a gate-lever and twisting four gate spindles.

Further efforts were made to overcome vibration on No. 6 unit and foundations were grouted, electrical tests made on field and stator windings, guide-vanes set to give even opening, and runner tried for balance, but all to no purpose.

At 8.50 a.m. on 3rd March, 1941, No. 5 turbine casing burst, causing extensive damage to equipment and a serious interruption to service. Water escaping from casing caused damage to other generating-units, and at 31st March, 1941, only Nos. 1, 3, and 9 were in service. No. 8 was put on the line after a short dry-out run, but broke down after four days. Exciters Nos. 1 and 2 got the full force of the water, and No. 1 is still on dry out. Governor-control and signalling-circuits were cleared of water and some new wiring run.

Control circuits, metering circuits, switchboard instruments, and relays were damaged. Meters and relays are still being cleaned by Test Department. Water also got into 66 kV. O.C.B.s, 6·6 kV. O.C.B.s, potential transformers, &c., but most of this apparatus is again fit for service.

The 110 volt D.C. lighting and power panels were rearranged for double-pole operation.

Waitaki.—Apart from routine maintenance, no repairs have been necessary on turbines, generators, transformers, switchgear, and auxiliary turbines and generators. Thirty defective insulators were replaced on the outdoor structure. The suction-tube-drain valves on Nos. 1 and 2 units have been swept away and so that the drainage pump could be used for Nos. 3, 4, and 5 suction tubes covers were fitted over the drain-holes, the services of a diver being requisitioned for this work.

The average monthly river-flow varied from 3,936 cusecs in August to 21,686 in February, 1941.

The maximum lake-level was 756·25 ft. The lake was below the crest of the dam 11th July, 1940, to 5th October, 1940.

The expansion joints in the dam were filled with bitumen, and galleries and water-channels cleaned out.

Owing to deterioration, the station battery was dismantled and scrapped.

Arnold.—Tests were carried out on turbines and governors to determine the suitability of the existing cams for the higher head.

The altered surge-tank has proved quite satisfactory in operation.

Dobson Diesel Station.—The overhaul was completed during the year.

The oil-coolers were altered and relocated.

Trouble was experienced with the mercury seal on one of the transformers, but this was discovered before any damage was done and the fault remedied.

(*b*) *Substations.*

General maintenance and operating was carried out at all transmission-line substations.

At Arahura on 17th October, 1940, the line terminals of the synchronous condenser flashed over probably due to moisture drawn in with the cooling air.

During heavy rains in March flooding took place at Ashburton Substation, when the water-pump motors were under water. Temporary water-supply was obtained from the borough.

(*c*) *Transmission-lines.*

A general overhaul of all transmission and distribution lines was carried out, including tree-cutting, testing and removal of decayed poles, replacing of all defective insulators, and attention to breakdowns and prompt restoring of power.

Live-line activities have been maintained, and included buzz-stick testing of insulators. A total of 106,042 insulators were tested, 845 were found to be defective, and, of these, 24 were changed alive. Forty-nine poles were renewed, several under live-line conditions.

On the Rangitata River towers-extension pieces and altered cross-arms were fitted.

To counter the effects of snow loading, cross-arms were reconstructed and altered on the towers on Arthur's Pass and Mount Misery. Alterations were also made to middle cross-arms on poles section from Arthur's Pass to Waimakariri River.

Treatment of poles for Ashburton–Timaru line was completed.

Piling was carried out in the Bealey, Otira, and Taramakau Rivers.

The telephone system was maintained in good condition.

3. Rainfall and Lake-levels, Year ending 31st March, 1941.

The maximum flow at Waitaki for the year was 31,700 cusecs on 4th February, 1941, while the minimum flow was 3,670 cusecs on 22nd August, 1940.

Lake Coleridge rainfall was 33·33 in.; Harper rainfall was 44·60 in.; Waitaki rainfall was 20·32 in. Lake Coleridge lake-level was 1,672·15 ft. at 31st March, 1941.

B. INVERCARGILL DISTRICT.

1. Supply, Consumers, Unit Sales, &c.

The year under review completes nineteen years' operations of actual retail electricity throughout the Southland District, comprising fourteen and a half years under the control of the former Southland Electric-power Board and four and a half years by the Public Works Department pursuant to the acquisition of the Southland scheme and reticulation by the New Zealand Government.

The licensed area of supply is 7,918 square miles, embracing the City of Invercargill, Boroughs of Gore, Mataura, South Invercargill, Bluff, Winton, Riverton, and Tapanui, Counties of Southland, Wallace, Tuapeka (part of), and Clutha (part of), Town Boards of Wyndham, Edendale, Otautau, Nightcaps, and Lumsden. The population in the area of supply is 74,000 (approximately).

A widespread network of electric-distribution lines makes it possible to supply electrical energy to practically every industry in the district, as well as to by far the greater number of dwellings therein.

The number of consumers and the connected load continues to increase at a satisfactory rate in the rural area controlled by the Department, as well as in the areas of the bulk-supply consumers—*i.e.*, Invercargill and Bluff. The increases shown in the following table explain the magnitude of the expenditure necessary for reinforcing and strengthening the feeder and distribution system:—

Year ended 31st March.	Rural Consumers.	Connected Load, in kW.	Invercargill Consumers.	Connected Load, in kW.	Bluff Consumers.	Connected Load in kW.
1933	9,299	32,116	5,229	13,720	445	1,300
1935	9,749	35,727	5,639	15,105	498	1,645
1937	10,638	39,893	6,182	17,434	531	1,746
1939	11,461	47,079	6,629	20,012	569	2,177
1941	12,190	54,439	7,042	24,291	596	2,697

The following table shows the amount of electrical energy, in units, supplied for various purposes. The revenue per unit clearly indicates the benefit being derived by the great majority of consumers from the reductions and modifications in the Government's charges for supply:—

—	Year 1941.		Year 1937.		Year 1933.	
	Units sold.	Revenue per Unit.	Units sold.	Revenue per Unit.	Units sold.	Revenue per Unit.
		d.		d.		d.
Domestic ..	6,775,932	2·389	5,739,138	2·701	5,310,906	2·71
Commercial ..	2,975,917	2·417	1,961,202	3·034	1,770,304	3·1
Industrial ..	8,408,156	0·977	8,112,392	0·928	4,992,157	0·964
Local body ..	11,322,300	0·552	7,359,280	0·777	5,646,540	0·795

"Commercial" includes milking motors, other rural power, shops, street lighting, &c. Units used for departmental purposes are excluded.

In addition to reducing the price of electrical energy to retail consumers in Southland the Department abolished meter rents as from 1st October, 1936, and as from 1st April, 1937, discontinued the former Southland Electric-power Board's practice of levying land rates.

One of the features revealed by the annual returns is the growth of the unit consumption in respect of three of Southland's important industries—*i.e.*, coal-mines, freezing-works, and lime-works. The following figures indicate that electricity continues in vital association with the industrial life of the district.

For Year ended 31st March.	Coal-mines.	Freezing-works.	Lime-works.
	Units used.	Units used.	Units used.
1933	208,440	2,681,333	217,089
1937	687,173	3,213,052	468,160
1941	1,027,924	4,180,208	1,152,219

Notwithstanding reductions in the Southland tariff increases have been made in the total annual sales of electric energy (for all purposes in Southland), as shown in the following comparative statement:—

	£
1935	131,272
1938	147,136
1941	157,727

The system designed to encourage consumers to pay electricity accounts in advance (a special allowance being granted to those who adopted this method) was continued. The object of the system is to enable consumers to eliminate the risk of losing discount through late payment of periodic accounts, to relieve consumers of the necessity of making frequent payments of small accounts, to reduce meter readings in certain cases, and to effect a saving for consumers in stationery and postages.

During the year many consumers agreed to an extension of the Department's system of estimating electricity accounts, thus enabling the Department to curtail the use of petrol and otherwise to economize in transportation costs. These savings would not have been possible had the consumers demanded actual readings of the electric meters. The Department expresses its appreciation of this evidence of co-operation.

Evidence of the popularity and convenience of payment of their electricity accounts at any money-order post-office in the district (other than Gore and Invercargill, where the Department's own offices are situated) is found in the fact that during the year 25,147 payments were made by consumers at the various post-offices.

Bad debts written off during the year amounted to only 0·117 per cent. of the year's total sales of electrical energy.

2. Operation and Maintenance.

(*a*) *Power-stations.*

Monowai Power-station came into operation again on 1st April, 1940, after having been shut down for some months, during which time extensive overhaul was carried out. Final inspection and adjustments to the turbine governors were made by the contractor's representative.

All load was dropped from Monowai on 5th December, 1940, in order to restore the level of Lake Monowai, which has since risen to capacity. Accordingly full load has been carried on occasions to prevent further rise and overflow.

New cables have been installed between the power-house and outdoor substation, and all apparatus in the high-tension yard has been appropriately coupled up to a new earth bus.

The Invercargill City Council's steam-plant was brought into commission on several occasions during the year as required.

(*b*) *Substations.*

At Invercargill Substation work is proceeding with the installation of new 11 kV. switchgear and metering-equipment. A bank of three single-phase 66/11 kV. transformers with a total capacity of 4,500 kVA. is also in the course of installation. This bank will supplement the existing bank, giving a total capacity of 9,000 kVA. for the substation.

At Gore Substation operation has been normal, while routine inspection and testing of apparatus has been carried out when convenient.

On 29th December, 1940, an interruption to supply lasting forty-three minutes occurred due to the breakdown of an intersystem metering-current transformer.

Instruction in live-line testing has been given at Gore, and subsequently all major lines and substations in the various districts have been tested. Faulty insulator units located in this manner have been replaced.

In the Gore Borough a new 11/3·3 kV. outdoor substation consisting of a 300 kVA. bank of transformers has been installed to replace the old installation.

Temporary rearrangement of the Winton Substation apparatus has been completed. This is to facilitate the installation of further steelwork and switchgear at a later date.

(c) *Transmission-lines.*

Overhaul of lines is being carried out by a small gang.

Pile-driving by contract has been proceeding at both Oreti and Aparima River crossings. The Oreti River crossing is now complete, while the Aparima Crossing is nearing completion. These installations remove weak links in the 66 kV. transmission-lines between Monowai and Winton.

At Ohai Substation two automatic reclosing oil-circuit breakers were installed in the 11 kV. feeders.

At Bluff Outdoor Substation the existing 300 kVA. transformer-bank was duplicated by the installation of a further 300 kVA. bank of Moloney transformers.

(d) *General Distribution.*

New transformer installations numbering ninety-three give an increase of 693 kVA. in feeder-transformer capacity.

A considerable amount of both high- and low-tension line overhaul was carried out in all areas.

Transformer overhaul has been carried out regularly at the Invercargill Workshop, while the field overhaul vehicle has recently been put into commission again.

Tests have been carried out on transformers, relays, instruments, rubber gloves, consumers' meters, and appliances, and also on various other apparatus.

(e) *Concrete-pole Factory at Winton.*

This factory has been in regular production during the year, the total number of poles cast to date being 609, of which 273 have been put into service.

(*f*) *Accommodation.*

Accommodation has been provided as follows: One faultman's cottage and garage built at Edendale; two cottages and single men's quarters built at Gore Substation; two cottages and single men's quarters and combined garage and store office built at Winton Substation; two faultsman's cottages are in course of construction at Balfour and Tapanui; and one faultsman's cottage was purchased at Riverton.

Preparations are being made for the erection of a social hall at Monowai.

(g) *General.*

In addition to routine work on records activity in the Draughting Office has been chiefly centered about works proceeding at Invercargill and Winton Substations, and also at Ohai and Bluff Outdoor Substations, as mentioned under those headings. Work on reticulation alterations has also been carried out as required, while the overhaul of distribution maps is proceeding.

Other work in conjunction with Winton Pole-factory has also been carried out from time to time as required.

C. NELSON DISTRICT: COBB RIVER SCHEME.

(a) *General.*

The negotiations for the acquisition of the generating-station at Cobb River were completed, and possession taken of the plant, &c., on the 22nd May, 1940. The 900 kW. Diesel station at Stoke, which was in running-order, was immediately leased to the Waimea Power Board to help that authority to meet its demand until such time as supply is available from the Cobb Station. The capital outlay at 31st March, 1941, was £362,772.

(b) *Power-station.*

The power-station building had been erected by the vendors, and practically all the generating-plant had been delivered to the site. The erection of the machines, &c., is a condition of the suppliers' contract, and will be commenced shortly.

(c) *Substations.*

Upper Takaka.—Land had been acquired and one cottage erected by the vendors. An additional parcel of land has since been purchased to provide space for the 66 kV. switchgear, and cottages for the maintenance staff.

Motupipi.—Land has been selected and Proclamation plans are being prepared.

Motueka.—A site has been purchased and drawings prepared for the layout of this substation.

Stoke.—The 11 kV. switchgear and transformers necessary to take supply from Cobb are at the site, and erection will be commenced shortly.

(d) *Transmission-lines.*

1. *Stoke–Cobb.*—The necessary poles, conductors, insulators, &c., had been purchased by the vendors and stored at various locations along the proposed route. Erection was commenced in January, 1941, and 138 pole structures have been completed.

2. *Stoke–Blenheim.*—A preliminary survey has been made for a possible line to give supply to Marlborough.

REGISTRATION OF ELECTRICAL WIREMEN.

The registration regulations were amended during the year and reprinted. All pressures above 20 volts are now included, with a few exceptions, all parts of radio sets are included, temporary wiring for experimental, demonstration, research, and testing purposes is exempted in certain places when carried out under the supervision of a qualified person, and the syllabus for the examinations has been extended to include subjects in connection with radio transmission and reception and the reduction of electrical interference with radio reception. A further endeavour was made to see that all electrical wiring work in mines is done in conformity with the Act.

Two ordinary examinations for electrical wiremen and electrical servicemen were held and several special examinations. Arrangements were made to hold special examinations for members of the armed forces who may be leaving for overseas between the regular examinations. The Electrical Supply Authorities are co-operating in the holding of the special examinations for members of the armed forces. The first examination for radio servicemen was held in March, 1941. As a result of bringing the whole of the radio-receiving set under the Act thirteen persons were granted limited registration for work only on the secondary side of the power-transformer. As a result of the difficulty in obtaining conduit it was decided to include in the wiremen's practical examination an exercise in the making-up of a flexible-cord extension. The results were very disappointing when compared with those obtained for similar work carried out by the candidates for the electrical servicemen's examination.

Included in the prosecutions for breaches of the Act were seven consumers for doing wiring; ten contractors for failing to notify the Electrical Supply Authority before beginning work; six salesmen for doing wiring; one showman; two apprentices for working without supervision; and five persons for employing unregistered persons to do wiring. One fatal accident resulted from the changing of a three-pin plug-top by an unskilled person.

The installation and servicing of washing-machines, radio sets, and other portable equipment by unregistered persons is still causing concern.

The statistics for the year ended 31st March are set out below (the figures in parentheses are for the previous year).

Number of meetings	18 (17)
Registrations—	
Inspectors	31 (38)
Wiremen—	
Full registration	168 (123)
Limited registration—	
Miscellaneous	35 (43)
Servicemen, Class D	15 (28)
Servicemen, Class E	14 (14)
Provisional licenses	27 (64)
Temporary permits	1 (18)
Reregistrations after periodical purging	7 (13)
Examinations—	
Wiremen's—	
Candidates—	
Written part	449 (527)
Practical part	360 (355)
Passed (per cent.)—	
Written part	32 (34)
Practical part	53 (52)
Highest marks—	
Written part	87 (91)
Practical part	91 (93)
Servicemen's—	
Candidates—	
Written part	103 (113)
Practical part	70 (99)
Passed (per cent.)—	
Written part	40 (34)
Practical part	67 (61)
Highest marks—	
Written part	100 (89)
Practical part	93 (95)
Defective work reports	36 (51)
Endorsements made	4 (2)
Endorsements removed	1 (3)
Breach of Act reports	91 (59)
Prosecutions authorized	51 (36)

DESIGN OFFICE.

Electrical Section.

(a) General.

In the year under review a large amount of detail design work was involved in connection with the various hydro-electric systems controlled by the Department.

Following the purchase of the Cobb River Scheme the completion of the design work for power-station, substations, and transmission-lines was undertaken.

Considerable delay has been experienced in receiving drawings of machinery and apparatus from overseas manufacturers, due partly to diversion of their staffs to more urgent work and partly to losses of drawings and technical data in transit. As a result the completion of the design work for the field has in many cases been delayed.

The standardization of types and sizes of insulated cable to be used for power and control circuits was undertaken, and it is intended in future to carry sufficient stocks to provide for all except major works.

Considerable attention has been given to the subject of fire-protection with the object of reducing the hazard in existing stations and minimizing the fire-risk in the design of new stations.

(b) Hamilton District.

Arapuni Power-station.—Foundation drawings were prepared for Nos. 5 and 6 generating-units and for the additional 110,000-volt switchgear to control these units and additional outgoing transmission-lines to Bunnythorpe and Edgecumbe respectively. The cable installation for the above units for designed specifications were prepared for the CO_2 fire-protection equipment for the new generating-units.

Karapiro Power-station and Village.—Drawings and specifications were prepared for construction purposes for a reinforced-concrete water-tower for the village and for the village substation. Preliminary designs were prepared for the power-station building and outdoor station building. Drawings were prepared for tendering purposes for main and auxiliary generating-units, transformers, cranes, switchgear, and control equipment. As the heaviest lift in the assembly of the main generating-units will exceed 150 tons there will be two main cranes operating in parallel through an equalizer beam for the heaviest lifts, but normally operating independently for all lifts up to their separate capacities. In view of the acute shortage of structural steel it is proposed to use reinforced concrete throughout for supporting the outdoor switchgear, and a preliminary design has been prepared for these supporting structures.

Substations: Detail designs were prepared for building extensions to Penrose Substation to provide a separate control-room for indoor and outdoor equipment at that station and at Mount Roskill Substation, which will be remote-controlled from Penrose.

A switchroom building was designed for Belmont Substation, and a relay house for Hamilton No. 2 Substation.

A preliminary design was prepared for an administrative building at Hamilton No. 1 Substation, which will house the District Office staff.

Layout and foundation drawings were prepared for additional or replacement outdoor switchgear, steelwork, and transformers at a number of substations.

A preliminary layout was prepared for a new substation at Lichfield.

(c) Palmerston North District.

Waikaremoana Lower Development (Piripaua).—Details, layout, and foundation drawings were prepared for main and auxiliary generating units, machine auxiliaries, and control equipment, and arrangement drawings for pipework and cable.

Substations: Switch-room extensions were designed for Melling and Stratford Substations.

Drawings were prepared for the new substation at Central Park, which will form a second point of supply for Wellington City. The site chosen is very favourably situated for supplying the major portion of the city load. The initial installed capacity will be 60,000 kVA.

Preliminary layouts were prepared for new substations at Upper Hutt, Pahautanui, and Greytown.

Layout and foundation drawings were prepared for replacement or additional switchgear and transformer-banks at several substations.

Drawings and specifications were prepared for equipment for handling transformers and other heavy plant, including 45-ton crane for Central Park, 25-ton cranes for Bunnythorpe and Masterton, 45-ton traverser-truck for Melling, and traverser trucks for Paraparaumu, Te Kiri, and Waipawa Substations.

(d) Christchurch District.

Highbank Power-station.—Drawings and specifications for the power-station building contract were completed. Layout and foundation drawings for station equipment are in hand.

Tekapo Power-station.—A preliminary layout drawing was prepared for power-station and equipment. The station equipment will include a 30,000-horse-power turbine, 21,600 kW. main generator, auxiliary generating-unit for station and local service, and bank of 110,000 volts step-up transformers. Provision is also being made for a bank of step-down transformers to supply the neighbouring district. The main turbine will probably be a Kaplan, or variable-pitch-propeller type.

Waitaki Power-station.—The design work for Nos. 3 and 4 generating-units was completed.

Substation: Drawings and specifications were prepared for reinforced-concrete substation buildings and water-tower for Hororata Substation, which is the main switching centre for the transmission-lines of the South Island system. Arrangements and foundation drawings were prepared for main outdoor equipment and drawings and specifications for overhead crane, traverser truck, and turntables, each of 40 tons capacity. Foundations were designed for 110,000-volt equipment at Ashburton which replaces existing 66,000-volt equipment. A preliminary layout was prepared for a new substation at Kumara.

(e) *Invercargill District.*

Monowai Power-station.—A social hall and an extension to the outdoor station building were designed. Drawings and specifications were prepared for new 66,000-volt outdoor steelwork and switchgear for Winton Substation.

(f) *Transmission-lines and General.*

Work in connection with the design and construction of transmission-lines that have been in the course of erection during the year has been dealt with.

The work has consisted of the preparation of drawings, specifications, charts, and data of various kinds, sag templates, design of special foundations, &c.

Other matters dealt with include concrete-pole and insulator tests, transmission-line parallels with telephone-lines, railway and river crossings, line-deviations, investigation of insect pests in imported Australian timber, &c.

Technical work has also been undertaken in connection with overhead travelling-cranes at a number of power-houses and substations. An investigation was also made in connection with proposals for strengthening turbine units at Lake Coleridge.

HYDRAULIC SECTION.

Investigations for future developments were continued as follows:—

Ohakuri.—Intensive studies by boring by geophysical methods and geological examination have been continued throughout the year, and tentative plans have been proposed for development at this site near Atiamuri.

Whakamaru.—Advance work has been done by geophysical methods and by geological examination, and plans are in hand to test the foundations by boring.

Waikato Survey.—A photo survey of the whole of the Waikato River from Taupo to Cambridge was made to supplement the ground work already done.

Works in hand.—Lake Taupo Control Works: The contractor commenced operations in June, 1940. The control gates are well advanced and deepening of the river is in hand. By the end of March the channel excavation totalled 277,000 cubic yards. Design work is virtually complete.

Arapuni: The penstocks for the two final machines are being constructed, as well as the intake gates, &c.

Karapiro: Construction was commenced by the General Branch in June, 1940. This work is well in hand, and designs are being prepared as required.

Waikaremoana Lower Development (Piripaua): This work is well advanced and designs are practically complete.

Cobb River: On taking over these works various features were redesigned—the tunnel was enlarged to provide for full development. The penstock was relocated to provide for the second line, while on account of the difficulty of getting steel, discarded pipes from Waipori have been incorporated in the proposals. Boring and testing for a suitable dam-site are in hand.

Highbank: Designs have progressed with concrete penstocks for the upper portion and intake gates and forebay.

Tekapo: Plans for the tunnel excavation and lining have been prepared.

I have, &c.,

F. T. M. KISSEL, B.Sc., M.I.E.E., A.M.I.C.E.,
Chief Electrical Engineer.

TABLE I.—SUMMARY OF FINANCIAL AND OPERATING STATISTICS FOR NORTH ISLAND AND SOUTH ISLAND ELECTRIC-POWER SYSTEMS FOR THE YEAR ENDING 31ST MARCH, 1941.

NOTE.—"North Island system" includes Arapuni–Horahora–Mangahao–Waikaremoana all interconnected. "South Island system" includes Lake Coleridge–Waitaki–Southland–Arnold River (Westland) all interconnected.

(*a*) Financial.

——		1940–41 (Seventh Year).
(1) **Capital outlay**—		
Assets in operation—		£
North Island system		9,843,028
South Island system		6,988,580
Total assets in operation ..		16,831,608
Assets not in operation—		
North Island system		1,718,677
South Island system		300,473
Total assets not in operation ..		2,019,150
Total capital outlay		18,850,758
(2) **Revenue for year**—		
North Island system		1,533,136
South Island system		678,813
Total revenue for year		2,211,949
(3) **Costs**—		
Working-costs—		
North Island system		640,884
South Island system		173,288
Total working-costs for year ..		814,172
(4) **Capital charges**—		
Interest—		
North Island system		336,073
South Island system		254,070
Depreciation—		
North Island system		Nil.
South Island system		73,711
Total capital charges for year—		
North Island ..	336,073	
South Island ..	327,781	
		663,854
(5) **Total cost for year**—		
North Island	976,957	
South Island	501,129	
		1,478,026
(6) **Net profit for year**—		£
North Island system		556,179
South Island system		177,744
Total profit for year		733,923
(7) **Allocation of Profits**—		
Sinking Fund—		
North Island system		148,937
South Island system		126,227
		275,164
Income-tax, &c.—		
North Island system		284,532
South Island system		51,517
		336,049
Reserve Fund—		
North Island system		122,710
South Island system		Nil.
		122,710
(8) **Accumulated Depreciation Reserve**—		
North Island system		1,112,633
South Island system		813,288
Total Depreciation Reserve ..		1,925,921
(9) **Accumulated Sinking Fund**—		
North Island system		1,308,951
South Island system		543,856
Total Sinking Fund Reserve ..		1,852,807
Arrears in Sinking Fund payments not yet appropriated—		
North Island system		Nil.
South Island system		214,654
(10) **Reserve Fund**—		
North Island system		303,958
South Island system		86,766
Total Reserve Fund		390,724

(Continued on next page.)

TABLE I.—SUMMARY OF FINANCIAL AND OPERATING STATISTICS FOR NORTH ISLAND AND SOUTH ISLAND ELECTRIC-POWER SYSTEMS FOR THE YEAR ENDING 31ST MARCH, 1941—*continued.*

NOTE.—"North Island system" includes Arapuni–Horahora–Mangahao–Waikaremoana all interconnected. "South Island system" includes Lake Coleridge–Waitaki–Southland–Arnold River (Westland) all interconnected.

(*b*) Operating Results.

		1940–41 (Seventh Year).
Maximum load (kilowatts)—		
North Island system		246,700
South Island system		84,920
Average load (kilowatts)—		
North Island system		142,231
South Island system		47,931
Average load factor—		Per Cent.
North Island system		57·65
South Island system		56·44
Units output—		
North Island system		1,245,947,813
South Island system		419,883,195
Combined		1,665,831,008
Units distributed—		
Units sold—		
North Island system		1,122,692,042
South Island system		358,442,353
Combined		1,481,134,395
Units unsold (station auxiliaries, &c.)—		
North Island system		5,500,429
South Island system		2,907,865
Combined		8,408,294
Total units distributed, North Island system		1,128,192,471
Total units distributed, South Island system		361,350,218
Combined		1,489,542,689
Line losses—		
Transmission and distribution—	Units.	Per Cent.
North Island system ..	117,755,342	9·45
South Island system ..	58,532,977	13·94 *
Combined	176,288,319	..

	1940–41 (Seventh Year)
Revenue—	
Per kilowatt (system maximum)—	£
North Island system	6·21
South Island system	7·99
Per unit generated—	d.
North Island system	0·295
South Island system	0·388
Per unit distributed—	
North Island system	0·326
South Island system	0·451
Per unit sold—	
North Island system	0·328
South Island system	0·454
Working costs—	
Per kilowatt (system maximum)—	£
North Island system	2·59
South Island system	2·04
Per unit generated—	d.
North Island system	0·1234
South Island system	0·099
Per unit distributed—	
North Island system	0·136
South Island system	0·115
Per unit sold—	
North Island system	0·137
South Island system	0·116
Capital charges—	
Per kilowatt (system maximum)—	£
North Island system	1·36
South Island system	3·86
Per unit generated—	d.
North Island system	0·0647
South Island system	0·1873
Per unit distributed—	
North Island system	0·0715
South Island system	0·2177
Per unit sold—	
North Island system	0·0718
South Island system	0·2195
Total costs—	
Per kilowatt (system maximum)—	£
North Island system	3·96
South Island system	5·90
Per unit generated—	d.
North Island system	0·1882
South Island system	0·2864
Per unit distributed—	
North Island system	0·2078
South Island system	0·3328
Per unit sold—	
North Island system	0·2088
South Island system	0·3355

* Retail transmission and distribution losses Southland Area 24·975 per cent.

TABLE II.—ANALYSIS OF CAPITAL OUTLAY AS AT 31ST MARCH, 1941.

North Island System.		South Island System.		Combined Totals.
Headworks and power-stations—		Headworks and power-stations—		
Land, fencing, and roading—	£	Land, fencing, and roading—	£	£
Arapuni	106,059	Coleridge	25,841	
Horahora	3,208	Waitaki	48,441	
Mangahao	74,707	Southland	12,226	
Waikaremoana	18,533	Arnold River (Kaimata)	1,456	
Taupo	30,693	Highbank	1,842	323,006
Headworks—		Headworks—		
Arapuni	1,221,524	Coleridge	550,679	
Horahora	151,468	Waitaki	1,073,524	
Mangahao	943,849	Southland	86,816	
Waikaremoana	199,148	Arnold River (Kaimata)	109,524	
,, Lower development	565,660	Highbank	18,763	
Karapiro	117,078	Tekapo	89,963	5,127,996
Generating-station, buildings, and village—		Generating-station, buildings, and village—		
Arapuni	257,872	Coleridge	101,073	
Horahora	61,037	Waitaki	488,974	
Mangahao	131,095	Southland	43,199	
Waikaremoana	263,802	Arnold River (Kaimata)	8,617	
		Highbank	13,143	1,368,812
Generating plant and machinery—		Generating plant and machinery—		
Arapuni	927,834	Coleridge	194,701	
Horahora	95,491	Waitaki	362,060	
Mangahao	220,978	Southland	60,641	
Waikaremoana	280,500	Arnold River (Kaimata)	26,843	
,, Lower development	56,003	Highbank	13,340	2,238,391
Auxiliary stations (three)—Penrose, Huntly, Grand Junction	77,695	Auxiliary station (one)—Dobson (ex Lyttelton)	133,220	210,915
Transmission and distribution—		Transmission and distribution—		
Primary distribution—		Primary distribution—		
11 kV. lines	62,822	11 kV. lines	540,747	
33 kV. lines	..	33 kV. lines	58,871	
50 kV. lines	422,883	50 kV. lines	..	
66 kV. lines	..	66 kV. lines	610,255	
110 kV. lines	1,855,470	110 kV. lines	392,557	
Secondary distribution	..	Secondary distribution	327,722	4,271,327
Substations—		Substations—		
11 kV. substations	13,345	11 kV. substations	..	
33 kV. substations	..	33 kV. substations	35,148	
50 kV. substations	416,953	50 kV. substations	..	
66 kV. substations	..	66 kV. substations	471,841	
110 kV. substations	1,135,896	110 kV. substations	257,747	2,330,930
General—		General—		
General offices, garages, stores, and other accommodation	70,326	General offices, garages, stores, and other accommodation	29,205	
Telephone services	178,123	Telephone services	77,437	
Explorations and preliminary surveys; engineering, office, and general expenses; charges and expenses of raising loans	576,825	Explorations and preliminary surveys; engineering, office, and general expenses; charges and expenses of raising loans	533,018	
Interest during construction	1,024,828	Interest during construction	489,619	2,979,381
Grand totals	11,561.705		7,289,053	18,850,758

TABLE III.—OPERATING OR WORKING COSTS FOR YEAR ENDED 31ST MARCH, 1941.

—	North Island System.				South Island System.			
	Cost.	Cost per Unit.			Cost.	Cost per Unit.		
		Generated.	Distributed.	Sold.		Generated.	Distributed.	Sold.
	£	d.	d.	d.	£	d.	d.	d.
(*a*) Hydro stations	63,859	0·0139	..	..	31,048	0·0178	..	..
(*b*) Fuel stations	12,380	2·9598	..	..	8,422	0·7072	..	..
(*c*) Auxiliary stations, power purchased, and standby provision	419,238	0·7097	..	..	523	2·5442	..	..
Generated and purchased	495,477	0·0954	0·1054	0·1059	39,993	0·0229	0·0266	0·0268
(*d*) Transmission	31,784	0·0061	0·0068	0·0068	24,565	0·0140	0·0163	0·0164
(*e*) Communication system ..	2,296	0·0004	0·0005	0·0005	1,373	0·0008	0·0009	0·0009
(*f*) Substations	42,390	0·0082	0·0090	0·0091	22,230	0·0127	0·0148	0·0149
(*g*) Distribution	2,160	0·0004	0·0005	0·0005	19,934	0·0114	0·0132	0·0133
(*h*) System operations	13,821	0·0027	0·0029	0·0030	11,782	0·0067	0·0078	0·0079
(*i*) Management and general expenses	52,956	0·0102	0·0109	0·0113	53,412	0·0305	0·0355	0·0358
	640,884	0·1234	0·1363	0·1370	173,288	0·0990	0·1151	0·1160

	North Island System.		*South Island System.*	
Units generated—				
Hydro	1,103,170,650		419,548,030	
Fuel	1,003,860		285,830	
Purchased	141,773,303		49,335	
		1,245,947,813		419,883,195
Units distributed		1,128,192,471		361,350,218
Units sold		1,122,692,042		358,442,353

APPENDIX E.

SEVENTEENTH ANNUAL REPORT OF THE MAIN HIGHWAYS BOARD.

The Hon. the Minister of Public Works, Wellington.

Sir,—

In accordance with the requirements of section 24 of the Main Highways Act, 1922, the Main Highways Board has the honour to submit its seventeenth annual report for presentation to Parliament. The report covers the period from 1st April, 1940, to 31st March, 1941, though a number of matters referred to are carried beyond the latter date for convenience and completeness of record.

General.

The present length of main highways maintained or subsidized by the Board is 12,381 miles, and particulars of expenditure for the year ended 31st March, 1941, as well as a detailed statement on the position of various works are given later in this report.

Of the total length of main highways, 3,990 miles have been classified as State highways, concerning which special reference is made in another part of the report. The total expenditure from the Main Highways Account for the financial year ended 31st March, 1941, amounted to £3,663,723, compared with £5,673,954 for the year immediately preceding. These figures include a number of charges against the account under special legislative authority and which are not directly related to matters covered by the Main Highways Act, 1922. Of the total reduction of £2,010,231, general improvement works account for £1,704,932 and maintenance £235,088.

The funds made available to the Board for the year were considerably less than for the previous twelve months, and they will be still further reduced for the current year. The combined causes are a reduction in revenue consequent on the petrol restrictions and the curtailment of capital funds to provide for the prior demands of war expenditure.

The general policy, as far as construction is concerned, has been to deal only with matters of urgency or military necessity during the war period, and to also provide the necessary maintenance to cope with the restricted traffic offering and to preserve the highways from deterioration.

As a result it has not been possible to complete a number of major construction works which were in hand, but in each case the reconstruction operations have been brought to a stage where the completed portions are made available for traffic, and the works already carried out will not be endangered.

Personnel.

During the year Mr. John Wood, Permanent Head of the Public Works Department, by reason of his retirement from the Public Service, relinquished his seat on the Board and the office of Chairman on the 11th March, 1941, and on the same date Mr. W. L. Newnham, Engineer-in-Chief and Under-Secretary of the Public Works Department, was appointed Chairman, and Mr. T. M. Ball Assistant Engineer-in-Chief of the Public Works Department, was appointed a member representing the Government and, pursuant to section 7 of the Main Highways Amendment Act, 1936, Deputy Chairman.

Dr. Marshall, Petrologist to the Board, resigned from the Government service, during the year and as a consequence severed his connection with the Board. The Board recorded in its minutes its appreciation of Dr. Marshall's services.

It is with deep regret that the Board records the death during the year of Mr. A. E. Jull, a foundation member of the Board.

Legislation.

New legislation affecting the Board and passed since last report was contained in section 4 of the Finance Act, 1940, empowering the Minister of Finance to borrow up to an additional amount of £2,500,000 for the purpose of construction of main highways. The total loan authority for highways now amounts to £15,200,000.

Finance.

The actual income of the Main Highways Account from revenue sources for the financial year 1940–41 amounted to £2,202,638. The following table shows how this amount is made up and also the corresponding figures over the previous nine years. In addition to this amount, apart from temporary accommodation which was raised and redeemed within the year, £1,347,975 was borrowed for main highways. The annual loan charges against the Main Highways Account decreased from £671,154 for 1939–40 to £587,747 for the year 1940–41. Although interest on loan-money showed an increase of £32,305, the amount transferred to reserve for redemption of main-highways securities showed a reduction of £115,140.

—	1931–32.	1932–33.	1933–34.	1934–35.	1935–36.	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.
	£	£	£	£	£	£	£	£	£	£
Proceeds of tax on tires and tubes collected through the Customs Department	84,649	63,253	62,979	91,693	93,308	138,894	158,526	149,017	102,706	62,888
Registration and license fees of motor-vehicles, &c.	372,224	354,216	354,444	355,990	397,606	545,763	523,853	575,170	588,386	546,760
Motor-spirits tax ..	1,231,202	644,126	669,868	970,506	1,449,125	1,697,942	1,918,486	2,083,278	2,057,001	1,581,793
Mileage-tax ..	..	..	1,133	1,284	1,616	3,290	6,162	7,474	10,715	11,197
Totals ..	1,688,075	1,061,595	1,088,424	1,419,473	1,941,655	2,385,889	2,607,027	2,814,939	2,758,808	2,202,638

The income from revenue sources for the year 1940–41 shows a decrease of £556,170 on the preceding year's figure.

The returns from the Customs tax on tires and tubes show a marked decrease on the corresponding figures for the previous year and are actually the lowest amount that has been received under this heading in any one year since the passing of the Main Highways Act, 1922. The record year was in 1924–25, when the amount received totalled £223,609.

Compared with last year, registration and license fees of motor-vehicles, &c., show a decrease of £41,626.

Revenue from motor-spirits tax is the chief source of the Board's income, and the reduction of £475,208 on the previous year's figure reduced the Board's revenue substantially, and is a direct result of the petrol restrictions at present operating, combined to some extent with the higher cost of petrol.

Although the revenue received from the mileage tax levied in respect of motor-vehicles using other than motor-spirits and trackless trolley-omnibuses again shows an increase, the amount would have been greater were it not that under the Substitute Fuels Emergency Regulations 1940, the mileage tax is not payable in respect of motor-vehicles propelled by an engine deriving its motor power solely from producer-gas or coal-gas or such other fuel used for the propulsion of motor-vehicles as may be described by the Minister of Transport as substitute fuel.

The gross importation of motor-spirits since 1927 is set out below and these figures are usually accepted as providing an index of maintenance and construction requirements. However, under present conditions this index is not as reliable as formerly, as the consumption of petrol by aeroplanes has increased considerably since the outbreak of war.

	Gallons.		Gallons.
1927 (January to December) ..	48,000,000	1934 (January to December) ..	64,600,000
1928 „ ..	54,500,000	1935 „ ..	65,300,000
1929 „ ..	62,400,000	1936 „ ..	86,800,000
1930 „ ..	68,300,000	1937 „ ..	85,700,000
1931 „ ..	61,800,000	1938 „ ..	102,300,000
1932 „ ..	58,400,000	1939 „ ..	104,100,000
1933 „ ..	55,400,000	1940 „ ..	93,600,000

Although the reduction in the gross importation of motor-spirits for the calendar year was only 10,500,000 gallons, representing a decrease of 10 per cent. on the importation for the previous year, the reduction for the financial year was much greater, and amounted to approximately 24 per cent.

The following is a summary of expenditure from the Main Highways Account for the year ended 31st March, 1941 :—

		Expenditure.
	£	£
Maintenance—		
North Island ..	716,217	
South Island ..	350,607	
		1,066,824
Renewals—		
North Island ..	127,934	
South Island ..	32,978	
		160,912
Construction and Improvements—		
North Island ..	807,913	
South Island ..	623,353	
		1,431,266
Administration and general charges ..		203,517
Loan charges (including commutation of toll-gate charges and of Hutt Road fees) ..		587,747
Subsidy on rates ..		213,457
		£3,663,723

An analysis of the expenditure for 1940–41 by the Board and by local authorities on **maintenance** of main and State highways as distinct from renewals, construction, interest on loans, and other overhead charges is shown in the tabulation below :—

—	Board's Contribution.	Local Authorities' Contribution.	Total.	Percentage Board's Contribution to Total.	Percentage Local Authorities' Contribution to Total.
	£	£	£		
North Island ..	716,217	82,872	799,089	89·63	10·37
South Island ..	350,607	52,429	403,036	86·99	13·01
Total ..	1,066,824	135,301	1,202,125	88·74	11·26

An analysis of the actual expenditure by the Board on maintenance in each Island, as compared with the number of motor-vehicles in each Island at the 31st March, shows the following comparisons for the last ten years in percentages :—

—	1931–32.	1932–33.	1933–34.	1934–35.	1935–36.	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.
North Island—										
Maintenance expenditure	62·31	62·84	63·80	65·44	64·80	66·82	66·46	69·26	68·28	67·14
Motor-vehicles ..	63·77	63·78	63·94	64·31	64·84	65·30	65·70	65·89	65·93	66·02
South Island—										
Maintenance expenditure	37·69	37·16	36·20	34·56	35·20	33·18	33·54	30·74	31·72	32·86
Motor-vehicles ..	36·23	36·22	36·06	35·69	35·16	34·70	34·30	34·11	34·07	33·98

NOTE.—Prior to 1936–37 these percentages relate rather to expenditure from the Revenue Fund, but as from 1st April, 1936, true maintenance figures have been recorded.

The following table shows an analysis of expenditure for the year 1940–41 by the Board and by local authorities on **renewals** in respect of main and State highways :—

—	Board's Contribution.	Local Authorities' Contribution.	Total.	Percentage of Board's Contribution to Total.	Percentage of Local Authorities' Contribution to Total.
	£	£	£		
North Island	127,934	16,367	144,301	88·66	11·34
South Island	32,978	2,341	35,319	93·37	6·63
Totals	160,912	18,708	179,620	89·58	10·42

An analysis of the Board's expenditure and the expenditure by local authorities for the year 1940–41 on **improvements and construction** shows the following position in respect of main and State highways :—

—	Board's Contribution.	Local Authorities' Contribution.	Total.	Percentage of Board's Contribution to Total.	Percentage of Local Authorities' Contribution to Total.
	£	£	£		
North Island	807,913	71,535	879,448	91·87	8·13
South Island	623,353	33,669	657,022	94·88	5·12
Totals	1,431,266	105,204	1,536,470	93·16	6·84

The following tabulation shows the amounts which have been provided by the Board and the local authorities on maintenance, renewals, and construction during the last ten years in respect of the complete highways system :—

—	1931–32.	1932–33.	1933–34	1934–35.	1935–36.	1936–37.	1937–38.	1938–39.	1939–40.	1940–41.
	£	£	£	£	£	£	£	£	£	£
Maintenance by Board ..	849,734	600,324	674,026	932,675	1,190,179	900,731*	1,074,112*	1,311,340*	1,301,912*	1,066,824*
Maintenance by local authorities	215,568	168,466	187,735	226,554	284,423	196,023*	153,443*	152,730*	151,368*	135,301*
Construction by Board ..	361,969	159,323	198,295	325,483	428,084	1,501,261†	2,318,600†	3,058,346†	3,297,110†	1,592,178†
Construction by local authorities	94,973	43,181	55,997	57,975	78,263	103,260†	108,225†	134,359†	172,839†	123,912†
Totals	1,522,244	971,294	1,116,053	1,542,687	1,980,949	2,701,275	3,654,380	4,656,775	4,923,229	2,918,215
Percentages.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Maintenance by Board ..	79·8	78·1	78·2	80·5	80·7	82·1	87·5	89·6	89·6	88·7
Maintenance by local authorities	20·2	21·9	21·8	19·5	19·3	17·9	12·5	10·4	10·4	11·3
Construction by Board ..	79·2	77·6	77·0	84·9	84·5	93·6†	95·5†	95·8†	95·1†	92·8†
Construction by local authorities	20·8	22·4	23·0	15·1	15·5	6·4†	4·5†	4·2†	4·9†	7·2†

* These figures represent true maintenance expenditure, whereas in preceding years expenditure under the Revenue Account was shown. † These figures and percentages relate to renewals and construction; previously renewals have been absorbed in both maintenance and construction.

The maintenance figure in the above tabulation excludes indirect charges such as supervision and interest, but includes the cost of flood-damage restoration. It will be noted that expenditure on constructional work was approximately £1,754,000 less than in the previous year.

The following statement shows the total expenditure by the Board in each Island on both maintenance and construction for the financial year ended 31st March, 1941, the latter including renewals. The figures take into account administration charges, but exclude interest on highways loans:—

—	Expenditure on Maintenance.	Expenditure on Renewals and Construction.	Total Expenditure in each Island.	Percentage of Expenditure in each Island.
	£	£	£	
North Island	771,035	1,007,476	1,778,511	62·13
South Island	377,442	706,566	1,084,008	37·87
Totals	1,148,477	1,714,042	2,862,519	100·00

MAINTENANCE.

The total maintenance expenditure by the Board and by local authorities amounted to £1,202,125, compared with £1,453,280 the previous year. It will thus be observed that the decrease under this heading is considerable, amounting to £251,155.

The average cost per mile was £97·1, as compared with £117·6 in 1939–40.

The feature mostly responsible for the reduced cost of maintenance has been reduction in traffic caused mainly by the imposition of petrol restrictions throughout the entire year.

The increasing length of sealed surfacing has no doubt also had an effect in reducing the cost of maintenance, but with new sealing-works having to be almost entirely suspended on account of financial limitations, the progressive reduction in maintenance costs on this account does not promise to continue in the immediate future.

The number of motor-vehicles registered actually showed a decrease as compared with the previous year, the respective figures being 313,087 and 317,526. This is the first time that there has been a reduction in the number of motor-vehicles registered in any one year compared with the preceding year.

Flood damage cost the Board £159,707, and after reviewing the expenditure for a number of years past it might be said that the year was an average one in this respect.

There has been a tendency for increased cost of materials, as well as a wage increase of 5 per cent., and but for these factors maintenance costs would have shown a still further reduction.

After reviewing all the relative influences, the Board is satisfied that the cost of maintenance for the year under review is reasonable.

The highways over the entire system have been maintained in a satisfactory condition. Efforts have been made to keep maintenance-costs down without allowing the standard to drop. As in past years, a number of complaints of faulty maintenance were investigated, but satisfactory explanations were made in all cases, or the position promptly rectified.

The Board proposes investigating maintenance-costs to see whether any further reduction in such costs is possible without reducing the standard of upkeep. It has always been one of the foremost points in the Board's policy to preserve its assets, and maintenance to a good standard is recognized as being essential in this respect.

TABLE 1.—MAINTENANCE OF MAIN AND STATE HIGHWAYS (INCLUDING BRIDGES).

Highway District.	Length Maintained.	Expenditure.												
		Board.	Local Authorities.	Total.	Average per Mile per Annum.									
					1940–41.	1939–40.	1938–39.	1937–38.	1936–37.	1935–36.	1934–35.	1933–34.	1932–33.	1931–32.
	M. ch.	£	£	£	£	£	£	£	£	£	£	£	£	£
1. Auckland North ..	839 78	62,004	8,180	70,184	83·6	111·2	100·7	115·1	93·2	110·1	97·9	71·6	61·2	79·2
2. Auckland South ..	1,514 31	129,391	22,106	151,497	100·0	123·7	129·2	126·2	119·3	181·4	141·1	124·6	106·9	145·3
3. Tauranga ..	710 67	98,858	4,373	103,231	145·2	216·7	158·8	128·4	84·3	153·1	87·1	72·9	61·9	70·7
4. Gisborne ..	396 72	70,446	5,208	75,654	190·6	214·2	266·5	215·2	182·9	178·1	164·9	106·4	96·3	117·3
5. Napier ..	735 45	77,471	8,216	85,687	116·5	147·9	285·6	99·6	82·4	138·9	117·7	81·4	79·3	75·9
6. King-country ..	604 30	78,872	8,413	87,285	144·4	152·8	113·0	95·3	116·5	89·2	99·7	70·8	57·1	70·0
7. Taranaki ..	474 17	58,347	4,020	62,367	131·5	117·8	122·1	94·7	104·1	123·4	102·5	83·8	84·5	125·2
8. Wanganui ..	533 49	63,733	5,101	68,834	129·0	147·4	157·1	152·5	115·9	122·0	87·5	80·8	66·0	101·0
9. Wellington West	522 59	41,744	7,133	48,877	93·5	152·9	105·7	102·9	121·9	164·1	124·7	106·0	110·8	149·8
10. Wellington East	504 41	35,351	10,122	45,473	90·1	104·1	88·9	89·4	108·0	175·3	181·3	114·9	91·4	128·6
Totals, North Island	6,837 9	716,217	82,872	799,089	116·9	144·5	149·5	119·7	109·0	143·2	118·3	91·3	81·0	104·5
11. Nelson ..	682 38	54,518	4,822	59,340	86·9	115·0	108·5	99·2	80·3	116·8	101·1	74·1	66·6	103·6
12. West Coast ..	572 78	83,530	5,798	89,328	155·9	171·6	157·4	145·5	141·8	214·5	142·6	110·8	104·1	136·7
13. Canterbury North	391 70	30,487	2,705	33,192	84·7	91·6	83·8	92·8	64·3	62·8	55·7	58·3	50·0	55·4
14. Canterbury Central	762 1	36,263	7,075	43,338	56·9	68·1	71·2	63·1	54·6	81·1	55·2	50·9	50·2	76·5
15. Canterbury South	834 15	34,447	6,203	40,650	48·7	52·9	58·3	52·6	54·0	96·7	66·9	59·3	67·0	78·7
16. Otago Central ..	842 49	38,138	8,067	46,205	54·8	65·9	66·5	53·8	49·5	70·1	75·1	50·3	46·4	52·8
17. Otago South ..	529 17	27,052	8,219	35,271	66·6	66·8	96·6	76·5	62·8	97·8	84·6	73·8	72·8	99·5
18. Southland ..	928 73	46,172	9,540	55,712	60·0	73·7	61·5	74·8	57·2	57·1	53·9	44·4	41·6	43·2
Totals, South Island	5,544 21	350,607	52,429	403,036	72·7	84·7	83·5	77·9	67·5	96·2	77·6	62·7	60·3	77·4
Totals, Dominion ..	12,381 30	1,066,824	135,301	1,202,125	97·1	117·6	119·9	101·2	90·5	122·4	100·3	78·5	70·7	92·5

FLOOD DAMAGE.

Brief reference was made to flood damage under "Maintenance." The cost of flood damage for the year was £159,707, which is approximately £13 per mile of highway, or one-seventh of the Board's total cost of maintenance. Viewing the cost in this way shows what an appreciable amount is expended each year upon restoration of flood damage.

During the year under review the districts which featured most prominently in this field were Taumarunui, £33,027; Taranaki, £24,500; Wanganui, £20,000; Napier, £18,505; and Nelson, £10,815.

On the forthcoming estimates the Board proposes to take a special item to cover the cost of flood-damage restoration throughout the highways system, and any future expenditure under this heading will no longer remain as a charge against districts' allocations. It is felt that this procedure will enable districts to more accurately estimate their maintenance requirements in any given year.

CONSTRUCTION, RECONSTRUCTION, IMPROVEMENTS, AND RENEWALS.

The expenditure on the three items construction, reconstruction, and improvements was £1,431,266, as compared with £3,106,471 in the previous year, indicating a reduction of over 50 per cent. in this phase of the Board's activities.

Details of more important individual works will be found later under the various district reports. A summary of the work completed is as follows:—

Improved formation	186 miles 36 chains.
Metalling	128 miles.
Dustless surfacing (mileage added)	243 miles.
Bridges	9,405 lineal feet.

The length of dustless surfacing added during the year was 243 miles, which, due to restriction of finance, is very little more than half the length carried out in the previous year. The total length of dustless surfacing is now 3,476 miles, which represents just over 28 per cent. of the total length of highways.

Indications are that new sealing will be drastically restricted until such time as finance permits resumption of operations in this field.

Bridge construction is an item upon which work must of necessity be undertaken as there are a large number of timber bridges on the highways system which have come to the end of their useful life.

As an illustration of this there were two failures of such bridges under load during the year.

The preparation of proposals for bridges was largely held up on account of the design staff being engaged on work which claimed priority, and as a consequence the programme effected was not as extensive as was desirable. The aggregate length of bridges completed was 9,405 lineal feet, as compared with 11,676 lineal feet in the previous year.

The bridge programme of the immediate future is likely to be adversely affected by lack of skilled men for construction and also by difficulty in obtaining the materials, but every effort will be made to maintain an extensive programme as otherwise the Board would find so many bridges requiring renewal at the same time that the position would be impossible. The relative importance of a number of bridges due for replacement has been carefully considered with a view to including the most urgent in the coming year's programme.

TABLE 2.—CONSTRUCTION WORK COMPLETED DURING YEAR 1940–41.

Highway District.	Formation and Widening.		Gravelling and Metalling.		Tar and Bituminous Sealing.		Road- and Plant-mix Bituminous Surfacing.		Bituminous Macadam (Penetration).		Footpaths.		Bridges.	Engineering Surveys.	
	M.	ch.	M.	ch.	M.	ch.	M.	ch.	M.	ch.	M.	ch.	Ft.	M.	ch.
1. Auckland North	2	74	4	29	14	38	..		..		2	0	789	14	0
2. Auckland South	8	49	16	61	30	26	..		..		2	34	789	22	45
3. Tauranga	6	24	8	65	11	23	..		..		0	27	600	..	
4. Gisborne	3	78	4	24	7	50	..		..		0	56	256	1	42
5. Napier	9	3	9	17	14	64	0	50	..		1	24	1,936	10	67
6. King-country	7	0	7	46	15	25	..		..		..		256	0	11
7. Taranaki	27	2	5	12	21	52	0	45	3	74	..		135	..	
8. Wanganui	12	39	..		13	23	..		..		0	78	278	38	5
9. Wellington West	10	32	..		13	74	..		..		5	31	308	2	2
10. Wellington East	5	70	0	49	1	0	..		..		..		389	6	47
11. Nelson	14	66	20	15	10	1	..		..		0	16	1,138	6	30
12. West Coast	10	35	15	35	27	67	..		..		1	13	563	7	72
13. Canterbury North	6	42	1	21	9	12	..		..		0	22	170	13	53
14. Canterbury Central	1	33	0	79	15	51	3	76	..		..		402	26	79
15. Canterbury South	8	61	..		9	23	5	16	..		1	23	576	21	70
16. Otago Central	12	78	15	52	14	20	..		..		0	8	423	6	50
17. Otago South	13	8	15	21	17	51	..		..		2	35	105	8	65
18. Southland	24	62	2	34	11	20	0	28	..		0	8	292	10	59
	186	36	128	0	258	60	10	55	3	74	18	55	9,405	198	57

Table 3 below shows the extent and types of work carried out on the main highways system by the Board and local authorities each year since the Board commenced active operations in 1924:—

Year.	Formation and Widening.	Gravelling and Metalling.	Tar and Bituminous Sealing.	Road and Plant-mix Bituminous Surfacing.	Bituminous Macadam (Penetration).	Bituminous Concrete.	Portland-cement Concrete.	Bridges.
	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Ft.
1924–25.. ..	19	63	6	..	6	..	..	2,434
1925–26.. ..	45	88	16	..	45	4	6	5,168
1926–27.. ..	174	151	35	..	38	12	16	6,408
1927–28.. ..	173	133	83	..	34	..	6	7,760
1928–29.. ..	224	185	122	..	51	14	11	9,482
1929–30.. ..	173	179	133	..	39	31	12	7,547
1930–31.. ..	130	128	95	..	41	14	9	11,175
1931–32.. ..	139	69	129	..	32	9	3	4,062
1932–33.. ..	56	45	72	..	8	..	..	3,178
1933–34.. ..	44	28	75	..	7	..	1	4,988
1934–35.. ..	113	69	172	27	3	..	2	6,641
1935–36.. ..	152	98	245	91	2	..	..	8,718
1936–37.. ..	272	131	184	67	3	..	..	9,575
1937–38.. ..	329	241	282	49	..	..	..	11,106
1938–39.. ..	491	188	357	67	2	..	..	25,561
1939–40.. ..	401	285	444	60	..	..	..	11,676
1940–41.. ..	186	128	259	11	4	..	..	9,405
Totals ..	3,121	2,209	2,709	372	315	84	66	144,884

TABLE 4.—LENGTHS OF HIGHWAYS METALLED AND SURFACED SINCE INCEPTION OF BOARD'S OPERATIONS (9TH JUNE, 1924).

At close of Period ending	Total Length of Highways.	Type of Surface.			Dustless Surfacing added during Year.	Percentage of Dustless Surfacing to Total Length of Highways.
		Pumice and Clay.	Gravel and Macadam.	Dustless Surfacing.		
	Miles.	Miles.	Miles.	Miles.	Miles.	
9th June, 1924 ..	5,954	1,535	4,171	248	..	4·2
31st March, 1925 ..	5,954	1,472	4,222	260	12	4·4
" 1926 ..	6,272	1,384	4,557	331	71	5·3
" 1927 ..	6,391	1,233	4,726	432	101	6·8
" 1928 ..	6,608	1,100	4,953	555	123	8·4
" 1929 ..	10,403	915	8,735	753	198	7·2
" 1930 ..	10,408	736	8,705	967	214	9·3
" 1931 ..	10,419	608	8,685	1,126	159	10·8
" 1932 ..	10,846	539	9,009	1,298	172	12·0
" 1933 ..	10,878	494	9,005	1,379	81	12·7
" 1934 ..	10,974	466	9,047	1,461	82	13·3
" 1935 ..	11,557	397	9,494	1,666	205	14·4
" 1936 ..	12,048	390	9,715	1,943	277	16·1
" 1937 ..	12,114	353	9,634	2,127	184	17·6
" 1938 ..	12,136	332	9,389	2,415	288	19·9
" 1939 ..	12,206	295	9,111	2,800	385	22·9
" 1940 ..	12,355	251	8,870	3,233	433	26·2
" 1941 ..	12,381	259	8,646	3,476	243	28·1
Percentage at 31st March, 1941	100	2·1	69·8	28·1	..	..

A general description of the more important highway activities in each district is given hereunder :—

Whangarei District.

A length of 14¼ miles of State and main highways was sealed during the year, a marked reduction in comparison with the previous year's record of 32 miles.

Owing to the large number of bridges in this district which are either in or approaching the "dangerous" stage, the bridging programme has not been curtailed to the same extent. Although only twelve bridges were actually completed during the year, in comparison with twenty-one in 1940–41, work on six others is in hand, and plans for several more are ready.

On the Whangarei–Awanui State highway, reconstruction was carried out on the Otonga–Whakapara, Mitchell's–Waiomio, Kawakawa–Moerewa, and Turntable Hill sections. The last mentioned, which is a very desirable deviation from a tortuous and dangerous section of highway, is now being completed under contract.

The erection of two bridges on the Otonga Flat completes a flood-elimination work north of Hikurangi.

The sealing of a further 1 mile 72 chains between Awanui and Kaitaia provides a continuous sealed surface over this 4½-mile length.

On the Dargaville–Maungaturoto State highway the sealing between Dargaville and Tokatoka was extended for a further mile, making a total of 7 miles on this section.

Farther south, between Raupo and Ruawai, and including the Muddy Mouth Deviation, sealing was carried out over approximately 3 miles.

On the Whangarei–Maungaturoto State highway the completion of the 170 ft. Otaika Bridge and 75-chain deviation, on improved alignment, eliminates the only section between Whangarei and Auckland which was previously subject to flooding.

The main work carried out on the Birkenhead–Maungaturoto State highway was the sealing of 3¾ miles between Kaiwaka and the junction of Nos. 3, 4, and 5 State highways. Some further progress was made with the construction of the Topuni Deviation, which has now been suspended.

On the subsidized highways, activities were mainly confined to urgent bridge renewals.

The largest of these completed were the Waima Bridge of three 45 ft. spans on the Waimamaku–Ohaeawai main highway, the 110 ft. Oramahoe and 44 ft. Foster's Bridges on the Pakaraka–Awanui main highway, and the 54 ft. Te Opou Stream Bridge on the Kaikohe–Maungatapere main highway.

The Rotokakahi Bridge on the Broadwood–Runaruna highway was extensively repaired, a new superstructure being erected and a further span added. The three sections of highway in the Kaikohe Town District were sealed, the total length being 3½ miles.

Auckland District.

A moderate sealing programme was carried out which added 28¾ miles to the district quota of dustless surfacing. Other works comprised chiefly the completion of reconstruction proposals already in hand and the renewal of urgent bridges.

North of Auckland the principal works were 1½ miles of sealing and a 66 ft. bridge on the Birkenhead–Maungaturoto State highway, 2 miles of reconstruction on the Helensville highway, together with the completion of the Helensville Overbridge, 2 miles of reconstruction on Beach highway, and 2¾ miles of sealing near Swanson.

A new bridge is in hand at Matakana, on the Warkworth–Leigh highway. A contract was let for an overbridge at Croydon Road Station, and subways are under construction by the Railways Department at Titirangi Road and Swanson.

The Auckland – Hamilton – Te Kuiti State highway is now completely surfaced throughout the district, except for a length of 8¼ miles at the southern boundary near Otorohanga, for which a contract has been let. The Otorohanga Overbridge has been completed, and the formation of the approach deviation is in progress. The bridge is 132 ft. long with a 24 ft. roadway and two footways.

On the Paeroa–Pokeno State highway reconstruction and sealing were completed over 4½ miles near Waitakaruru.

The Kirikiri Stream Bridge on the Paeroa–Thames State highway, which was in a dangerous condition, has been replaced by a temporary bridge, and the erection of a permanent structure commenced.

On the Rahu–Waikino section of the Paeroa–Whakatane highway 2¼ miles of reconstruction and sealing were carried out.

The Piako River Bridge on the Hamilton–Paeroa highway, a three-span structure 150 ft. long, was completed, and the approaches are nearing completion.

Widening and footpath work has been carried out in the Paeroa Borough.

On the Hamilton–Rotorua highway a length of 2 miles in the Matamata County was reconditioned, widened, and resealed.

On the county highways the principal works comprised the completion of current reconstruction and sealing proposals and the erection of short bridges and culverts.

Widening and footpath work was carried out on the Titirangi highway in the Waitemata County.

In the Franklin County 4¼ miles was sealed between Glenbrook and Waiuku, and a further 8½ miles of reconstruction is in hand towards Kohekohe, 4 miles being metalled. Reconstruction and metalling were completed over 6¾ miles from Kingseat to Titi. On the Pukekohe – Glen Murray highway the sealing of 4¾ miles was completed and a 75 ft. bridge erected.

Between Tuakau and Port Waikato a length of 2½ miles received the final sealing-coat.

The Piako County section of the Taupiri–Morrinsville highway is now completely surfaced, the remaining 2¾ miles having been treated during the year.

The second coat was applied on a 4-mile length of the Hamilton–Tauhei highway.

On the Te Kauwhata highway improvements over a length of 2¾ miles, including a 91-chain deviation, have been carried out, and a small bridge is in hand.

A second-coat seal was applied on 4 miles of the Te Awamutu – Cambridge highway, and a further 3¼ miles was reconstructed and sealed.

Three miles was similarly treated on the Cambridge–Eureka highway.

Reconstruction prior to surfacing has been carried out over a length of 2 miles on the Orongo–Netherton highway. The improvement of the Waihi Beach highway was completed by the sealing of the second section of 2¾ miles.

On the Waihi–Coroglen highway widening and the construction of short bridges have been continued.

The Thames–Coromandel highway was improved by widening, beach-protection, and ½ mile of sealing. A new bridge was erected over the Tararu Stream in the Thames Borough.

On the Waitoa–Wairakei highway the sealing of 2¼ miles has completed a dustless surface from Auckland to Putaruru via Hamilton and Tirau. Farther south the reconstruction work on a 22-mile length was extended, and now comprises 18½ miles of formation, 17½ miles of metalling, and 7¼ miles of first-coat sealing, of which 5¼ miles has received the second coat.

The 90 ft. Ngutuwera Bridge was erected, and a bridge over the Pokaiwhenua Stream is in hand.

On subsidiary highways a number of minor works have been undertaken by the local authorities concerned.

Tauranga District.

On the Paeroa–Whakatane State highway 12 chains of reconstruction was completed, 4 miles 16 chains metalled, and 5 miles of sealing carried out. An 80 ft. concrete bridge was erected at Waitao.

Between Rotorua and Whakatane the Tarawera River Bridge, 150 ft., was completed, together with 2 miles of reconstruction; 3½ miles received a sealing-coat.

On the Whakatane–Gisborne highway 12 chains of reconstruction work was completed at Waiotahi.

Sealing has now been completed between Taupo and Wairakei, and a 50 ft. bridge was erected between Rotorua and Wairakei.

The erection of the lake-control gates at Taupo has involved the realignment of the highway on both sides of the gates.

Between National Park and Taupo considerable improvements have been carried out, including the completion of the 120 ft. Tauranga–Taupo Stream Bridge and 60 chains of sealing at Waitahanui. The Waimarino Stream Bridge is in hand.

Reconstruction on the Waitoa–Wairakei highway has been carried out over a length of 1½ miles.

Between Opotiki and Te Araroa 1 mile of reconstruction work, cutting out dangerous corners and flooded areas, has been completed, and two concrete bridges totalling 200 ft. erected at Torere.

On the Matamata–Tauranga highway, Kaimai Hills section, reconstruction has been effected over 1 mile 53 chains, and 1 mile 63 chains was metalled. The construction of the Judea Bridge has been put in hand.

Gisborne District.

On the Whakatane–Gisborne via Waioeka State highway the sealing of the roadway and footpaths through Matawai Township was carried out.

The regrading of the northern side of Otoko Hill was completed.

On the Gisborne – Te Araroa State highway the reconstruction and regrading of a low-lying section at 44½ m. was completed. This will obviate flooding and damage by silting at this point.

A new concrete bridge, consisting of two 50 ft. spans with 24 ft. roadway, was constructed over the Mangapukatea Stream near Tokomaru Bay. It replaces an old timber truss bridge on bad alignment. To provide filling for the approaches to the new bridge, 1 mile of regrading and reconstruction on Busby's Hill was carried out, and the alignment greatly improved.

Sealing was completed through three townships on this highway—namely, Tokomaru Bay, Te Puia Springs, and Tikitiki.

The first section of the Mangahauini steel sheet-piling protective works at 60·35 m. was constructed during the year; 562 lineal feet of wall was completed, and back-filling is in hand.

Between 59 m. and 64 m., 77,300 trees were planted out.

On the Gisborne–Napier via Hangaroa State highway 1 mile 49 chains of reconstruction, 2 miles 14 chains of one-coat seal, and 2 miles 24 chains of two-coat seal were completed. A new concrete balanced cantilever bridge 96 ft. in length was built, replacing an old suspension bridge at Avondale.

Steel sheet-piling for protective works is in hand at Hangaroa.

The second-coat sealing of the reconstructed length of the Gisborne–Ormond via Waiohiki highway was completed. The whole of this highway is now dustless.

On the Patutahi–Rere highway 1¾ miles of second-coat seal was carried out.

The roadway and footpaths through Ruatoria Township on the Mangakino–Waiomatatini highway were sealed.

On the Opotiki – Te Araroa highway the Nukutahara Stream was bridged with a 60 ft. steel truss reconditioned from the old Uawa River Bridge at Tolaga Bay.

Sixty-three chains of sealing was completed from Tokomaru Bay Township towards the wharf.

The low-level bridge at Wigan, on the Tolaga–Tauwhareparae highway, was completed. It is 86 ft. in length.

The Kowhai Bridge at 7 m. on the same highway, which was damaged in the 1938 flood, was reinstated. New piers and abutments were built and an extra span added.

Napier District.

The work carried out has been confined mainly to the completion of short lengths of sealing, preparations for which had already been made, also of lengths of formation, &c., in cases where only a small amount of additional work was necessary to bring them into use. A number of urgent bridge renewals have also been put in hand or completed during the year.

On the Taupo–Napier State highway construction work was carried on from July until October, 1940, on the Runanga Deviation, and a 205 ft. water-drive 9 ft. by 9 ft. 7 in. in cross-section has been completed on Baker's Deviation.

On the Mohaka River – Eskdale section construction work was also carried on for a few months, 4 miles 30 chains of formation being completed.

One-coat sealing has been completed over a total length of 7¼ miles, and a 3-mile length of priming has been put down.

On the Gisborne–Napier via Hangaroa State highway a new concrete bridge 300 ft. long, and 55 ft. above water-level, has been completed over the Mangapoike River at Opoiti. Work on the approaches is in hand. In the same locality a short timber bridge was replaced by a twin 6 ft. pipe culvert 64 ft. long, and similar work was undertaken in the case of two other bridges near Wairoa. A small amount of reconstruction work was carried out north of Wairoa. The replacement of the old Waikare River Bridge by a concrete structure is in hand. Three miles of sealing was carried out.

The construction of a concrete bridge with 24 ft. roadway over the Esk River, comprising eight 60 ft. spans, has been completed. The original bridge was carried away by the disastrous Hawke's Bay flood of 1938. Since then traffic has been carried on a temporary structure. Adjacent to the new Esk River Bridge the construction of a concrete overbridge 96 ft. long was put in hand to eliminate a dangerous railway-crossing, and is now completed.

South of Paki Paki, on a tortuous section of the Napier – Palmerston North State highway, 3 miles of heavy formation has been completed. The formation work was closed down last December, but in order to make as much as possible available for traffic the metalling of 1¼ miles is now in hand.

In the Waipawa Borough 34 chains of reconstruction and sealing and 50 chains of plant-mix resurfacing have been carried out.

The Maharakeke Bridge, 178 ft. long, has been completed, together with 18 chains of approaches.

A dangerous section will be eliminated by the completion of the Piri Piri Deviation, 1 mile 5 chains in length, which is now in hand.

Reconstruction with improved alignment has been completed on the Maharahara–Matahiwi North and Matihiwi South Deviations, 76 chains and 41 chains long respectively.

A concrete bridge 80 ft. long over the Manga-atua Stream has been completed.

Priming was carried out on a 20-chain length of the Dannevirke–Waipawa County Boundary Deviation.

On the Te Uri – Norsewood main highway a length of 1 mile 73 chains has been reconstructed near the Mangahei Road junction.

The approaches to the Orua–Kiritaki Bridge have been reconstructed on the Woodville County section of the Woodville–Tamaki main highway.

On the Waipukurau–Matamau main highway the approaches to the Papatu Overbridge have been completed.

The Ngaruroro River Bridge at Pakowhai, on the Farndon–Paki Paki main highway, consisting of nine 75 ft. spans, together with the approaches, has been completed, and the old timber bridge dismantled.

The Morea concrete bridge 80 ft. long, and its approaches, which are on a 70-chain deviation, have been completed on the Otane–Tuki Tuki main highway.

On the Dannevirke–Waipukurau main highway, 2 miles 24 chains of reconstruction and sealing has been completed in Waipukurau County, and 1 mile 40 chains in Patangata County.

The formation and metalling of the Waitahora to Cross Roads Deviation, 36 chains long, has been completed.

The total lengths of highway in the district prepared or being prepared for sealing are as under: Prepared for sealing but not primed, 1½ miles; prepared for sealing and primed, 3¼ miles.

Taumarunui District.

Substantial progress was made with the improvement of the State highways in this district, 7¼ miles being sealed on reconstructed surfacing north of Taumarunui, and 6½ miles on the southern section. The elimination of several narrow lengths with sharp curvature has been undertaken, involving heavy formation in papa of a total length of 1½ miles. This includes the Mangatupoto Deviation, 29 chains in length, with a 72 ft. bridge over the Ohura River and a 12 ft. arched culvert. The work has now been completed, with the exception of the bridge approaches.

Between the Ongarue turnoff and Taumarunui, 4½ miles of formation and metalling were carried out, and a further 1½ miles remains to complete this section for sealing.

On the Manunui–Piriaka section 30 chains of highway was raised above high-flood level, 7 chains of stone protective-work being provided.

Twenty-five chains of formation and metalling were carried out to complete the reconstruction of 7¼ miles between Owhango and Oio, and the sealing-coat has now been applied on the greater part of this length.

Several short lengths have been sealed on the secondary highways, and 1 mile was reconstructed and metalled on the Pio Pio – Tatu highway.

The restoration of damage caused by the severe flood of February, 1940, has been continued, and has necessitated a great deal of work throughout the district.

Taranaki District.

North of New Plymouth the principal work on the State highway has been the virtual completion of the reconstruction of the 8-mile section between New Plymouth and Waitara, which has now been surfaced throughout, except for a portion of the final seal-coat.

A 135 ft. bridge has been erected over the Waiongona Stream.

Plant-mix surfacing was laid on 45 chains of the Mimi Valley Deviation, and 2½ miles was reconstructed and sealed on the Pukearuhe highway.

South of New Plymouth the 3½-mile length between the Ngaere Overbridge and Eltham has been reconstructed and sealed, also 1¼ miles between Boylan Road and Te Roti.

The Rugby Road subway was completed, and brought into use by traffic.

On the coastal highway via Opunake, 1¼ miles of sealing was carried out at Oakura and 30 chains at the Otahi Bridge.

On the Stratford–Taumarunui highway the unmetalled length of 4½ miles in the Tangarakau Gorge was reduced to 60 chains, and this has also now been metalled, completing the metalling of the highway. This was the only clay-surfaced section remaining in the district. The work was done in conjunction with the restoration of damage caused by the flood of February, 1940.

The Egmont highway is now completely surfaced, a length of 3½ miles having been improved and sealed by the Taranaki County Council.

A considerable amount of reconstruction, widening, and sealing has been carried out by the counties on the subsidized highways, the total length involved being 13¾ miles, in addition to the sections mentioned above.

Wanganui District.

The improvement of several sections of the Hawera–Wanganui State Highway has been continued, although under present conditions it has not been possible, in some cases, to bring the original proposals to completion.

The ¾-mile Manutahi Hill Deviation was extended by 5 chains and sealed, while the ½-mile and ¼-mile reconstructed lengths at the Manawapou Hill and Kakaramea were also surfaced. At the Whenuakura Hill Deviation a further 10 chains was formed, and 32 chains, representing one-half of the whole work, received a sealing-coat. On the Westmere section 2¾ miles of the 3½-mile length under improvement was reconstructed, of which 2 miles was sealed, and 35 chains of the deviation near Virginia Lake also received a sealing-coat.

The major improvements on the National Park – Wanganui State Highway, or Parapara Road, were added to by 12 chains of reconstruction, 4 miles of sealing, and 2 miles of priming-coat. A large mass-concrete culvert was constructed at the Auriki Stream. The extension of the formation work into the Waimarino County section has not been proceeded with under present conditions.

On the Horopito–Bulls highway the 17-mile length between Waiouru and Taihape is being brought up to an improved standard, 7¼ miles of formation being completed. A large concrete culvert was built 4¾ miles north of Taihape, and a temporary bridge erected over the Hautapu River to replace one damaged in an accident. A contract for a permanent structure has been let.

The 3¼-mile length between the Makohine Viaduct and Mangaonoho Flat was sealed, thus completing 58½ miles of bituminous surface from Bulls to a point 2½ miles north of Taihape, except for a short length at the Vinegar Hill Overbridge.

The 50 ft. Porewa Stream Bridge was erected. The bridge is on the deviation leading to the above overbridge, and the formation of this is well in hand.

Two large culverts were installed south of Rata.

The reconstruction and priming of a 5-mile length of the Rapanui Beach highway were completed, and 1½ miles of this was sealed. The sealing of the remainder has been carried out since the beginning of the present year.

The reconstruction of 4¼ miles of the Curls Bridge – Upper Tutaenui highway was completed up to the top-course metalling, and sealing deferred till next season.

On the Greatford–Ashhurst highway the old combined railway-bridge at Kakariki, now replaced by a new structure, was taken over from the Railways Department, and completely decked for highway traffic.

A 4-mile length on the Wanganui–Kauangaroa highway was completed as to the reconstruction and metalling, and the sealing was commenced.

Some short lengths of subsidiary highways have been improved, and several bridges and large culverts constructed.

Wellington West District.

The new coastal section of highway between Plimmerton and Paekakariki, 9 miles in length, which was taken over by the Board in April, 1940, still requires its final sealing-coat; but this work has been deferred under present conditions, and in order to obtain the maximum value from the first coat, which was made heavier than the usual "primer." During the year a good deal of minor work was done by way of guard-fencing, sealing the footpath, construction of culvert-walls, and the planting of 8,500 trees for beautifying purposes.

In the Ngahauranga Gorge the construction of large pipe culverts and water-drives was continued, and 2,000 ft. of steel sewer-pipe laid to serve the city abattoirs. The reconstructed section was severely damaged by flood in February, and restoration work has necessitated the installation of an additional 700 ft. of 6-ft.-diameter concrete pipe culverting.

On the State highway south of Levin, 1¼ miles of footpath was constructed, and two sharp corners near Paraparaumu improved by deviations.

On the Napier - Palmerston North State highway, widening to 24 ft. was continued in the Manawatu Gorge, but the work has now been suspended.

The pavement through the Upper Hutt Borough on the Masterton–Wellington highway is being widened to 24 ft. over the 3-mile length, and a cycle-track provided. The Taita Gorge Section was seriously eroded by flood in March of this year, and the highway is being carried back into solid side-cutting. The surfacing of the $6\frac{1}{2}$-mile Haywards–Pahautanui highway, which was taken over during the year, was completed by an additional mile of sealing. This highway constitutes the main connecting-link between the Hutt Valley and the northern arterial route, and is also part of the principal alternative exit northward from Wellington.

The pavement on the Shannon–Makerua section of the Levin - Palmerston North highway was widened and improved over a length of $1\frac{1}{4}$ miles, and $1\frac{3}{4}$ miles was sealed on the Kairanga County section. A 178 ft. bridge was erected over the Tokomaru River, also two shorter bridges.

The reconstruction of the Waitarere Beach highway was completed, and a contract let for plant-mix surfacing of the final section of $2\frac{1}{4}$ miles. On the Palmerston North - Himatangi highway a further mile of original surfacing was reconstructed and sealed. The approaches to the Longburn Overbridge were completed and the bridge brought into service.

Sealing was also carried out on several of the subsidiary highways to a total length of 10 miles, and three short bridges were completed.

Wellington East District.

No works other than maintenance sealing were required on the State highways in this district. The widening of the $3\frac{1}{4}$-mile Makuri Gorge section of the Pahiatua–Akitio highway was completed, an adjacent 60-chain deviation with two bridges being deferred.

A number of bridges were erected by the counties, the principal of these being the Taueru Bridge of one 95 ft. and two 76 ft. spans on the Masterton-Stronvar highway, Whakataki of one 65 ft. and two 52 ft. spans on the Masterton–Castlepoint highway, Mangapokia of 104 ft. on the Blairlogie-Langdale highway, and several shorter bridges and large concrete culverts.

Work is in hand on a 90 ft bridge over the Kopuaranga Stream in Mauriceville Township. Some short lengths of reconstruction and sealing were also carried out on the subsidized highways.

Nelson District.

The programme of works instituted on the inception of the State highways system has, during the past year, been somewhat curtailed. A total length of $12\frac{1}{4}$ miles has received a sealing-coat, and a further $6\frac{3}{4}$ miles has been or is being prepared for sealing.

The reconstruction programme was gradually slackened off during the year, and there are now none of these works in progress in the district.

On the Picton–Christchurch highway $\frac{1}{4}$ mile of formation and metalling was completed at the Koromiko Deviation, the highway at Massacre Hill near Tuamarina was raised over a length of 7 chains, and on the $2\frac{1}{2}$-mile deviation between Tuamarina and Spring Creek the 960 ft. Wairau Bridge and all bridge approaches have been completed. This deviation, which is now in use by traffic, eliminates two level crossings, and shortens the distance between Picton and Blenheim by nearly a mile.

Between Riverlands and Dashwood a further $3\frac{1}{2}$ miles has received a dust-laying seal-coat, and $1\frac{1}{4}$ miles was reconstructed between Seddon and Ward. The approaches and gabion protection at Kekerangu River Bridge have been completed, and a 36-chain deviation and 70 ft. bridge at Tirohanga Flat have eliminated three small obsolete bridges and a section of highway subject to flooding.

On the Blenheim–Nelson highway the raising of 23 chains of road at Double Crossing, near Havelock, has obviated traffic being held up by floods. Ward's and Bown's culverts and approaches, between Canvastown and Pelorus, have been completed, and a dust-laying seal-coat applied for $6\frac{3}{4}$ miles between Rai Valley and Wangamoa Hill; a further $6\frac{1}{4}$ miles is ready for similar treatment.

The major reconstruction works on the Wangamoa Hill were discontinued early in the year, 1 mile of metalling completing this work to the foot of the hill on the Nelson side; the 50 ft. Wakapuaka River Bridge at Teal Valley is in hand.

On the Richmond–Collingwood highway the protection of the Riwaka River Bridge is in hand, and the work of repairing flood damage on the Takaka Hill has been continued during the year, several thousands of yards of spoil being shifted, and extensive concrete and stone pitched retaining-walls erected. In this locality a large area of land has been purchased for afforestation, with the idea of preventing constantly recurring flood damage. A further $\frac{1}{2}$ mile of formation and 1 mile of metalling on the Takaka–Onekaka reconstruction were completed before the works were suspended.

On the Nelson–Westport highway the improvements at Arnold's, near Korere, have been completed by the reconstruction and metalling of $1\frac{1}{4}$ miles.

The Hope Saddle - Eight Mile reconstruction closed down in January, by which time $1\frac{1}{2}$ miles of formation and $3\frac{3}{4}$ miles of metalling had been completed, as well as a large reinforced concrete retaining-wall at Rotorua Point, near Gowan Bridge.

Protective fencing, chiefly on hill sections, has been erected in various parts of the district, the total for the year being $4\frac{1}{4}$ miles.

On main highways maintained by the Board, $\frac{1}{2}$ mile of preparation for sealing is in hand on the Nelson Aerodrome highway, and on the Murchison–Maruia via Shenandoah highway $1\frac{1}{4}$ miles of formation and metalling have been completed.

On county highways some progress has been made. Major repairs to Ferntown Bridge and extensive sea-erosion protection works have been carried out in the Collingwood area. One-coat sealing of a 2-mile section between Spring Creek and Raranga has been completed, and a culvert installed at Robert's Ford on the Murchison–Maruia via Matakitaki highway. Repairs to extensive flood damage to groynes at Woodman's Bend on the Dashwood–Upcot highway, and major repairs to Branch River Bridge on the Renwicktown – Hope Junction highway, are in hand.

On the Korere–Tophouse highway, Coleman's Creek culvert has been completed, and the 30 ft. Marathon Bridge is in hand on the Seddon–Marama highway.

Greymouth District.

The general improvement of the principal highways has been continued as far as financial limits would allow, the principal works being on the Inangahua–Greymouth–Waiho and Nelson–Westport State highways, and the Westport–Karamea, Westport–Greymouth, and Reefton – Hanmer Junction highways.

Between Inangahua and Greymouth five lengths totalling 10¾ miles were sealed, and this work is now continuous from Ikamatua to Greymouth, except for a short length at Orwell Creek Bridge. North of Reefton 1¼ miles was widened and metalled, and 2¼ miles between Ahaura and Big Grey. New bridges are in progress at Hard Creek and Orwell Creek.

Farther south the improvement work between Hokitika and Ross was continued, 1¾ miles being formed and metalled and 2¾ miles sealed.

Widening was continued from Westport towards Inangahua, and has now reached the 8½ m. peg, except for a 10-chain gap, and nearly half this length has been sealed. Two short bridges were erected, and a water-drive to replace Neam's Creek culvert is in progress.

On the Christchurch–Kumara State highway the 90 ft. bridge over Harley's Creek has been completed, and some sealing carried out in the Arthur's Pass Township.

The improvement works on the Karamea highway north of Westport have been continued; during the year 13 miles was sealed, and there is now a total length of 19¼ miles of bituminous surfacing on this section.

On the Westport–Greymouth coastal highway the 200 ft. Nile River Bridge was completed, together with the approach deviation of 57 chains.

Widening was continued between Charleston and Punakaiki, and the 2½-mile Barrytown Deviation, which includes a 100 ft. bridge over Fagans Creek, is now practically complete.

The reconstruction of the Reefton – Hanmer Junction highway was continued, ½ mile being completed together with 3¼ miles of metalling. Three bridges were also erected.

Canterbury District.

Good progress is being made with sealing-works, and a total of 42¼ miles was completed. A feature of the work over the past few years has been the increasing use of plant-mix, 9¼ miles being treated with this type of paving.

The major improvement to the State highway in the northern portion of the district was the sealing of the 5-mile section from the Kahautara River to Kaikoura. Farther south, between Hurunui and Domett, 4¼ miles were also sealed, and preparation work carried out in Cheviot Township, which has since been sealed. A contract has been let for sealing through the Parnassus Township.

The widening between Parnassus and Oaro was stopped through lack of funds, though the approach to the overbridge at Hundalee was completed in the early part of the year.

The construction works in the Cheviot and Waipara Counties were terminated, with the exception of a block-cutting at Stonyhurst, which is being completed. Altogether improvements to alignment were effected on sections totalling 46 chains.

A contract has been let for the erection of a concrete bridge at Benmore, which will result in greatly improved alignment of the highway north of Tormore.

In the Weka Pass, on the inland route between Waipara and Kaikoura, an 80 ft. bridge was completed early in the year, and a second-coat seal was applied over 2 miles between Pigeon Rock and Waikari.

On the Lewis Pass route a 90 ft. bridge spanning the Kakapo Creek has replaced the existing temporary bridge.

Between the Christchurch City boundary and the Waimakariri River Bridge, shoulders were widened to provide cycle-tracks on both sides of the concrete road. The extra width has materially improved traffic conditions.

From Rangiora to Cust the final 2½-mile section of sealing was completed.

On the arterial route to the West Coast the sealing of 8 miles from Kirwee was completed, also a section in the Sheffield Township. The contract has now been extended to Sheffield, and over a 30-chain section in the Springfield Township.

The 132 ft. bridge and approaches over the Craigieburn Stream have been completed, thus eliminating two fords which caused considerable trouble to motor traffic.

Between Cass and Waimakariri, widening and realignment were continued, a further 60 chains being completed.

The 270 ft. Hawkins River Bridge on the Darfield–Arundel highway was nearly completed. This bridge eliminates a very difficult river-crossing.

The reconstructed section of 3 miles between Governor's Bay and Lyttelton has been sealed, and the realignment of the old road between Teddington and Allandale was completed for 1¼ miles.

Nearly 4 miles of plant-mix paving was carried out on the highway to the Harewood Aerodrome, and on the connecting highway from Belfast, on the northern State highway, to Hornby, on the south State highway. This gives a complete sealed route, by-passing Christchurch, between these highways.

Reconstruction work in the Akaroa County was continued between Duvauchelles and Takamatua Bay, a total length of 1½ miles being carried out.

The section through Little River Township has been sealed, and a 24-chain deviation at Kaituna formed and prepared for sealing.

A contract has been let for sealing the 3-mile section of new highway from Burwood to Marshland.

In South Canterbury the 13-mile contract for plant-mix paving between Winchmore and Methven has been completed, 5 miles being laid during the year, in addition to short lengths of two of the highways which run through the Methven Township.

A ½-mile section in the Rakaia Township was also made dustless.

The Ashburton County completed the preparation of a 6-mile length from Cochrane's Road to Chertsey Road on the main highway to Wakanui, but the sealing has been deferred.

In the Geraldine County four small bridges, totalling 142 ft. were completed, in addition to 2 miles 30 chains of one-coat seal on the highway from Geraldine to Fairlie.

On the new highway from Rangitata to Geraldine, which gives Geraldine direct access to the State highway, a 30 ft. bridge was completed at Coopers Creek, and the full length of 5¾ miles received a one-coat seal.

At the Winchester railway-crossing, on the Christchurch–Timaru State highway, where the proposal to erect an overbridge was abandoned for the duration of the war, the unsealed length of 43 chains was treated with a light coat of sealing. On this highway a 280 ft. concrete bridge has been erected across the Hinds River, replacing an old narrow wooden structure.

On the State highway from Timaru to Lindis two new bridges of 30 ft. each were completed by the Mackenzie County Council at Cricklewood and Coal Creek. The approaches have been formed and metalled, and the bridges are in use by traffic.

Otago District.

No major works have been necessary on the Timaru–Dunedin State highway during the year, the sealing of bridge approaches, the construction of side-tracks for horse-drawn traffic on the Goodwood Hill, and the installation of a large concrete culvert being the principal items.

Protection work was continued at Kartigi Beach.

The improvement of the Lindis Pass section of the Timaru–Cromwell highway, although not completed, has been sufficiently advanced to provide an easy route over the Pass between Central Otago and Omarama.

On the Milton–Queenstown State highway, reconstruction work is being continued on a reduced scale between Alexandra and Roxburgh and between Frankton and Queenstown, in order to improve alignment, grades, and road widths. On the 21½-mile Alexandra–Roxburgh section, 10¼ miles of formation and a 30 ft. bridge have been completed, while on the 3½-mile Frankton–Queenstown section 1½ miles of formation and metalling have been carried out to date. A further 3½ miles of sealing has been applied, and there is now a continuous dustless surface between Alexandra and Roaring Meg Creek in the Kawarau Gorge. Provision has been made for pedestrians between Cromwell and Cromwell Railway-station by the construction of a footway on the Clutha River Bridge and 20 chains of footpath.

Sixty-five chains of the Palmerston–Clyde highway in Ranfurly Township has been sealed.

Reconstruction and sealing has been completed on a 17¾-mile section between Pukeuri and Kurow, while in Kurow Township the highway is being prepared for sealing, and kerbing is being constructed.

All but 15 chains of the Dunedin–Waitati alternative northern route into Dunedin, via Leith Valley, has been formed; but the works have now been closed down.

A 35-chain deviation has been completed which eliminates two railway-crossings at Kokonga, on the Kyeburn–Middlemarch highway.

Some further progress has been made with the improvement of poorly aligned and narrow sectiosn of the highway between Wanaka and Haast, but except for a deviation near Alberttown, which is in hand, the work was suspended in the early part of the year.

On the Dunedin–Gore State highway reconstruction and sealing have been completed to Clinton, while improvement work is in hand between Clinton and Waipahi, where a length of 3 miles has yet to be completed.

Included in this section is a 2 mile 30 chain deviation at Waipahi, which will eliminate two railway-crossings and locate the highway clear of the flood area near Waipahi Township. The proposals include an overbridge and a short bridge over Webb Creek. Formation was completed last year, and Webb Creek Bridge is nearly completed. Work has commenced on the erection of a 180 ft. overbridge to eliminate a level crossing at Wairuna.

Other work carried out on this highway comprises the construction of 75 chains of concrete footpath between Caudleton and Milton, 1 mile 48 chains of kerbing and channelling in Milton Borough, and the formation of 1½ miles of footpath between Green Island and Fairfield.

Reconstruction of the Milton–Queenstown State highway was continued until August, when the works were closed down. Reformation and metalling have been completed from Clarksville to within a mile of Waitahuna, except for ¾ mile of bridge approaches. The deviation at Round Hill, to eliminate a dangerous level crossing, has been completed and is open to traffic. A 2 mile 30 chain length between Roxburgh and Coal Creek has been sealed.

On the Dunedin–Harrington Point highway the 105 ft. Anderson's Bay Bridge has been completed.

Sealing of the 5½-mile section of the Dunedin – Duke's Road Railway-station highway, between Dunedin and the Taieri Aerodrome, has been completed, and work is in hand on a 2-mile deviation made necessary by the aerodrome being extended to include portion of the highway.

The 1½-mile Kaitangata Borough section of the Balclutha–Wangaloa highway has been sealed.

Preparation for sealing has been completed on the 1¼-mile section of the Roxburgh – Miller's Flat highway between Roxburgh and Roxburgh Railway-station, but sealing is deferred at present.

On the Gladstone highway a length of 2 miles 12 chains has been sealed between Riccarton and Wingatui Corner.

The Baratta Creek Bridge on the Balclutha – Kaka Point highway is being replaced by a 10 ft. by 10 ft. concrete culvert.

Southland District.

The bituminous surfacing of the Dunedin–Gore–Invercargill–Bluff State highway in this district has been completed by the sealing of short lengths at the Okiterama Overbridge and McNab flood-improvement sections, and of the 8-mile length between Invercargill and Bluff which was recently improved and widened, the work being completed during the year.

Twenty-eight chains of widening and reconstruction was also carried out in the Bluff Borough.

On the Invercargill–Queenstown highway the reconstruction between Invercargill and Winton has now been suspended, with 6¾ miles completed to the base-course stage, and of this 2¾ miles is ready for sealing.

The Lorne–Riverton State highway has been improved in both the Southland and Wallace Counties, a total length of 7¼ miles having been reconstructed, including the widening or renewal of six short bridges.

The principal work on the Lumsden – Te Anau – Milford Sound highway has been the continuation of the Homer Tunnel and Milford Sound Road. The tunnel is being ring-drilled in preparation for enlargement to full size, more than half the length having now been dealt with. A test length of 30 ft. was enlarged to full section.

The concrete avalanche-protection work at the Homer portal was completed, the total length being 490 ft. Similar work is in progress at the Cleddau or Milford portal, 62 ft. having been installed.

On the Milford Sound Road part-width formation has been carried up to 9 m. 20 ch., and from that point to the tunnel, at 10 m. 65 ch., the formation is 60 per cent. complete in sections, which still require to be linked up and to have bridges provided.

Twelve small concrete bridges have been built, and foundations put in for two larger bridges over the Cleddau.

On the Edendale–Wyndham highway a contract has been let for a 540 ft. bridge over the Mataura River, and pile-driving is in hand.

A ¾-mile length was sealed east of Wyndham. On the Winton–Gore highway 1¾ miles is being widened and improved.

The Oreti Bridge on the Winton–Ohai highway was damaged by flood, and extensive repairs were carried out on five spans.

Two miles of reconstruction and sealing have been carried out on Dunn's highway, which connects Oreti Beach with Invercargill. A cycle-track was also provided on this length.

A footway has been constructed on the bridge over the Waiau River at Tuatapere.

LEVEL CROSSINGS ELIMINATIONS.

During the year the expenditure on this item was £57,483, bringing the total since the inception of the programme to £857,183.

Seven crossings were eliminated, making a total of 115, and a further 9 are in hand. In three of these cases the overbridges are completed and the approaches are being formed.

The noticeable decrease in level-crossing accidents on the highways system during the last year or two is undoubtedly attributable to the works carried out under this programme, commenced in 1936; but there are still a few special cases which have been unavoidably held over where it is very desirable that elimination should be effected as soon as funds are available.

STATE HIGHWAYS.

It is perhaps appropriate to point out here that the State finds the whole cost on State highways, and also that while the Board's total expenditure on the complete highways system during the year was £3,663,723, the expenditure by local bodies on main highways was only £259,213, or 6·6 per cent. of the total expenditure.

It is recognized that local bodies could not possibly have faced up to the provision of the funds necessary to meet their share of the cost of bringing the arterial routes up to a standard demanded by the ever-increasing number of motor-vehicles, and this was one of the main reasons for the introduction of the State system.

During the period that has elapsed since the inception of the State highways system it has been possible to assess the advantages accruing from the introduction of the scheme. Essential improvement works have been carried out on arterial highways where the traffic density is greatest, and the main roading system has now reached a standard where it is of great value as a measure of defence. One of the improvement works recently put in hand as a home-defence measure was the reconstruction of the Taihape-Waiouru section of the Horopito–Bulls via Taihape State highway. This work is now nearing completion, and when finished will not only provide an up-to-date highway for the benefit of the motoring public, but will also be of great military value should an emergency occur.

The carrying-out of such improvement works would not have been possible with each county working independently and within its own financial resources, as was the case before the introduction of the State system.

The Board has also been able to introduce the patrol system, thus ensuring a more uniform standard of maintenance, as a patrol does not have to confine itself to a particular county section, but can operate over such lengths as will permit of the efficient and economic use of the Board's plant and organization. For this reason it has been possible, where the density of traffic is greatest, to provide a higher standard of road surface than could be expected under local-body control, where the position was governed by the opinions of the local body and the finance, plant, and organization available to it.

Similarly, on the sections of highway carrying a less volume of traffic, reasonably good roading-facilities have been provided. The Board's programme has thus made it possible to concentrate funds for expenditure where required.

While the largest expenditure was on State highways to provide for their heavier traffic densities, the Board also expended substantial sums in the way of subsidies to local bodies on the highways remaining under their control.

The success of the Army manœuvres carried out early in the year is a striking testimony to the standard of the State highways system.

CONTACTS WITH LOCAL BODIES AND AUTOMOBILE ASSOCIATIONS.

Although it is regretted that personal contact with local bodies and automobile associations was not possible during the year owing to the postponement of the Board's annual tour of inspection, the usual high standard of co-operation was extended by local authorities and automobile associations.

The measure of assistance granted in this connection is greatly appreciated, as is also the efforts made by all concerned to adjust their programme of work within the limits of the finance available. The Board looks forward to the maintenance during the current year of the same cordial relationship as has existed in the past.

FOOTPATHS AND CYCLE-TRACKS.

In September, 1937, the Board decided to subsidize on a £1 for £1 basis the construction of footpaths on sections of highway in localities where the amount of pedestrian traffic justified this work as a safety measure, and local authorities have to a considerable extent taken advantage of the proposal.

It was made a condition that the footpath should be sealed, so that there would be less tendency to walk on the surfaced roadway.

Up to 31st March, 1940, a total length of 21 miles 63 chains of footpaths had been constructed, and a further 18 miles 55 chains was added last year, the greater part being on State highways.

The above figures include a few cases of footways being added to existing bridges.

The provision of cycle-tracks, by strengthening and sealing the shoulders of paved surfaces, has also been undertaken in several closely-settled areas.

SIGNPOSTING, CENTRE-LINE MARKING, ETC.

As in previous years, the Board provided a £3 for £1 subsidy on the cost of signposting carried out on main highways by automobile associations. The amount thus expended from the Main Highways Account for the year ended 31st March, 1941, was £3,408. Since its inception the Board has contributed a total of £30,170 towards this work.

ADVANCES TO LOCAL AUTHORITIES.

During the year under review the Board continued its policy of granting loans to local bodies for highways works. The amount involved was nearly three times that for the previous year. The number of loan agreements entered into was ten, covering an amount of £15,651, compared with seven agreements totalling £5,531 for the year 1939–40.

The total amount advanced to 31st March, 1941, was £317,271, the amount outstanding at that date being £73,573.

PLANT.

Local authorities again availed themselves of the facilities provided by the Board to acquire plant under the hire-purchase scheme, although only to about half the extent of the previous year. The total purchases for the year 1940–41 amounted to £23,252, as compared with £56,122 for the previous year.

Since the inception of the scheme, plant to the value of £367,542 has been purchased, of which amount £66,808 was outstanding at 31st March, 1941.

The items thus acquired during the year were: Graders, 9; trucks, 5; angle-dozers, 2; shovel, 1; crusher, 1; air compressor, 1; tractor, 1; and roller, 1.

Owing to the necessity of conserving overseas exchange, the Board continued its policy of declining the purchase of any machine where such exchange was involved, and advocated the acquisition of plant of local manufacture.

In addition to the foregoing, the Board purchased the following plant items for its own use: Diesel engines, 15; portable huts, 11; graders, 3; pump and motors, 3; scrapers, 2; dump wagons, 2; crane, 1; petrol engine, 1; fan and motor, 1; generating-set, 1; steam-hammer, 1; bitumen pre-heater, 1; spraying-machine, 1; mower, 1; pile-driver, 1; snow-plow, 1; winch, 1.

TESTING OF HIGHWAYS MATERIALS.

In the petrological laboratory a considerable number of tests have been performed with the Los Angeles abrasion machine, principally with a view to obtaining all the information possible regarding the supplies of stone suitable for sealing-chips in each highways district. The results of representative tests are shown in Table 7. The machine is designed to combine the effects of abrasion and impact in one operation, and gives the result quickly and conveniently

The testing of bituminous materials was carried out by the Dominion Analyst, as in past years. Though the reduced sealing programme was reflected to some extent in the number of samples submitted, extra work was involved in some cases by the necessity of making and testing trial mixtures to enable all available materials to be utilized.

OPERATIONS OF MAGNETIC TRUCK.

During the year the Board's magnetic truck, used for clearing highways of iron or steel puncture-producing articles, operated on main highways for a period of about three months only, largely in the South Island. Early in the year it was decided to discontinue the use of the truck for the duration of the war, it being felt that, taking into consideration the urgent necessity of conserving petrol and the expense involved, the continued use of the truck under existing conditions was not warranted. After this decision was made the Air Department made use of the truck for the purpose of clearing nails, &c., from the buildings area and flying-fields adjacent to the following R.N.Z.A.F. Stations: Wigram, Harewood, Woodbourne, Rongotai (Stores Depot), Ohakea, New Plymouth, Whenuapai, and Hobsonville. Trentham, Papakura, and Ngaruawahia Military Camps were also swept.

The length of highways actually cleared was 1,323 miles, the weight of material picked up being 3,881 lb.

The average yield per mile was 2·9 lb., compared with 3·1 lb. for the previous year.

EXAMINATION FOR FOREMEN AND OVERSEERS OF ROAD-CONSTRUCTION.

Owing no doubt to war conditions, only thirty candidates, as compared with seventy-three the previous year, sat for the fifteenth examination for Foreman and Overseers of Road Construction, held on 30th October, 1940.

Fifteen candidates sat for the paper on general road construction and maintenance only, eight for that on tar, bituminous, and concrete road construction only, and seven for both papers.

Of the seven candidates who sat papers Nos. 1 and 2, two were successful in passing both. Five candidates passed paper No. 1 only, while three passed paper No. 2 only. These three had previously been successful in passing paper No. 1, and thus completed the examination.

Certificates of Competency were awarded to all candidates who passed or completed the examination, the recipients being Messrs. A. Amos, C. W. Gray, E. M. Le Grice, G. P. McIntosh, and E. Sherson.

A certificate was also awarded to Mr. J. W. Weaver, who had completed the examination previously. The issue of a certificate earlier had been withheld while Mr. Weaver acquired more experience.

To date 141 certificates have been issued.

DECLARATIONS AND REVOCATIONS OF MAIN HIGHWAYS.

Owing to the heavy commitments against reduced highways funds arising from the immediate requirements of the existing highways system, only a very small mileage of new highways was declared during the year. A number of small adjustments were found necessary.

During the year also a general reorganization of highways, involving alterations in nomenclature, &c., was effected. State highways were declared under the names by which they are more generally known, routes of highways more clearly defined, especially in town districts and the smaller boroughs, terminal points shown more exactly, and mileages corrected.

The more important declarations of highways during the year ended 31st March, 1941, were:—

Main Highways declared.

	Miles	ch.
No. 1 Highways District—		
Blackbridge–Paihia	8	57
No. 2 Highways District—		
McLennan main highway	2	3
No. 6 Highways District—		
Bruce main highway	2	5
No. 9 Highways District—		
Masterton–Wellington	3	7
Wellington–Paekakariki Centennial	10	0
Haywards–Paremata via Pahautanui	6	40

Consequent on the completion of the new coastal route to Paekakariki, this road was declared a main highway, and subsequently classified as a State highway under the title "Wellington–Paekakariki Centennial State highway." The Paekakariki Hill route, formerly the State highway, was revoked, but later redeclared as an ordinary main highway. The Hutt Road between Ngahauranga and Petone was declared a main highway, and this length, along with the highway between Lower Hutt and Upper Hutt, was classified as part of the Masterton–Wellington State highway.

The Board acknowledges the continued co-operation of the Public Works Department in matters relating to main-highways administration, and records its appreciation of the valuable services rendered by officers of the Department in carrying out the Board's programme during the period under review.

The accompanying tables contain statistical information relative to finance, lengths of highways, and results of stone-testing carried out during the year.

Signed on behalf of the Main Highways Board:

W. L. NEWNHAM, Chairman.

TABLE 5.—MAIN HIGHWAYS ACCOUNT.

STATEMENT SHOWING PARTICULARS OF NET EXPENDITURE ON CONSTRUCTION, RENEWALS, MAINTENANCE, &C., FOR THE YEAR ENDED 31ST MARCH, 1941, AND TOTAL TO DATE.

—	Construction and Improvement of Main Highways.		Renewals of Main Highways.		Maintenance, Repairs, &c. of Main Highways.		Totals.	
	Total for Year 1940–41.	Total since Inception of Main Highways Act, 1922, to 31/3/41.	Total for Year 1940–41.	Total since 1/4/36 to 31/3/41.	Total for Year 1940–41.	Total since Inception of Main Highways Act, 1922, to 31/3/41.	Total for Year 1940–41.	Total since Inception of Main Highways Act, 1922, to 31/3/41.
Highway District—	£	£	£	£	£	£	£	£
No. 1	73,417	*1,379,823*	17,682	*112,247*	62,004	*965,780*	153,103	*2,457,850*
No. 2	186,852	*2,673,959*	21,916	*138,960*	129,391	*1,767,845*	338,159	*4,580,764*
No. 3	79,232	*902,595*	14,781	*57,438*	98,858	*972,044*	192,871	*1,932,077*
No. 4	26,715	*625,650*	7,515	*78,351*	70,446	*741,082*	104,676	*1,445,083*
No. 5	69,956	*786,975*	26,633	*64,335*	77,471	*1,109,707*	174,060	*1,961,017*
No. 6	71,930	*775,653*	3,064	*20,953*	78,872	*733,538*	153,866	*1,530,144*
No. 7	61,464	*901,808*	6,077	*27,784*	58,347	*691,800*	125,888	*1,621,392*
No. 8	123,151	*863,128*	6,116	*25,387*	63,733	*713,956*	193,000	*1,602,471*
No. 9	101,397	*1,425,626*	9,571	*34,170*	41,744	*796,230*	152,712	*2,256,026*
No. 10	13,799	*420,450*	14,579	*51,637*	35,351	*658,360*	63,729	*1,130,447*
Totals for North Island ..	807,913	*10,755,667*	127,934	*611,262*	716,217	*9,150,342*	1,652,064	*20,517,271*
No. 11	110,198	*982,151*	5,943	*13,575*	54,518	*757,785*	170,659	*1,753,511*
No. 12	96,001	*999,356*	8,429	*83,748*	83,530	*1,208,158*	187,960	*2,291,262*
No. 13	52,375	*319,102*	..	*192*	30,487	*335,535*	82,862	*654,829*
No. 14	69,690	*825,817*	2,154	*5,731*	36,263	*527,033*	108,107	*1,358,581*
No. 15	29,851	*504,780*	3,466	*9,339*	34,447	*598,122*	67,764	*1,112,291*
No. 16	78,363	*788,404*	2,205	*12,362*	38,138	*472,581*	118,706	*1,273,347*
No. 17	63,120	*818,751*	4,679	*11,840*	27,052	*430,645*	94,851	*1,261,236*
No. 18	123,755	*975,697*	6,102	*28,168*	46,172	*550,481*	176,029	*1,554,346*
Totals for South Island ..	623,353	*6,214,058*	32,978	*165,005*	350,607	*4,880,340*	1,006,938	*11,259,403*
Totals for Dominion	1,431,266	*16,969,725*	160,912	*776,267*	1,066,824	*14,030,682*	2,659,002	*31,776,674*

TABLE 5.—MAIN HIGHWAYS ACCOUNT—*continued.*

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1941, AND TOTAL TO DATE.

EXPENDITURE.		Total for Year 1940–41.	Total since Inception of Main Highways Act, 1922, to 31/3/41.
		£	£
Net expenditure on construction, renewals, maintenance, &c. (see separate statement)		2,659,002	*31,776,674*
Administration—			
Administration expenses (including salaries, travelling-expenses, office rents, printing, stationery, postages, and miscellaneous expenses)	£ 189,797	..	*1,162,183*
Fees and travelling-expenses of members of the Main Highways Board other than Government members	770	..	*20,175*
Miscellaneous expenses—			
Advertising, maps, rent of halls, traffic tallies, transport of samples, depreciation of furniture, &c.	82	..	*6,198*
Compassionate grants to widows and relatives of deceased employees	..	..	*4,000*
Compensation under section 3, Public Works Amendment Act, 1925	..	..	*1,015*
Exchange on remittances	1,615	..	*9,705*
Grant to Transport Department towards Traffic inspection	10,000	..	*42,906*
Petrological laboratory and other experimental work, Expenses of	1,253	..	*14,251*
Total administration		203,517	*1,260,433*
Loan charges—			
Charges and expenses of raising loans, management charges of Consolidated Stock on account of Construction Fund, &c.	164	..	*72,830*
Interest on amount appropriated out of Public Works Fund and paid into Main Highways Account Construction Fund	61,300	..	*674,300*
Interest on loans, recoupment to Consolidated Fund (section 4, Finance Act, 1919)	314,500	..	*1,908,948*
Transfer to reserve for redemption of main highway securities	1,647,080	..	*2,790,490**
Payment to local authorities in commutation of toll-gate charges (Finance Act, 1925, section 20)	1,522	..	*31,724*
Payment to Wellington City Council in commutation of fees chargeable in respect of motor-vehicles using Hutt Road (Finance Act, 1927 (No. 2), section 33)	25,786	..	*304,411*
Total loan charges		2,050,352	*5,782,703*
Subsidies, &c., in respect of other than main highways—			
Municipal Corporations (Municipal Corporations Act, 1933, section 71)	35,656	..	*309,101*
County Councils and other local authorities (Finance Act, 1930, section 37)	177,980	..	*1,837,337*
Subsidies to County Councils for rebate to ratepayers (Finance Act (No. 4), 1931, section 45)	..	..	*253,893*
Subsidy on rates levied on farming land (Finance Act (No. 3), 1934, section 28)	*Cr.* 179	..	*364,252*
Maintenance and construction of roads giving access to outlying areas (Finance Act (No. 3), 1931)	..	..	*45,918*
Total subsidies		213,457	*2,810,501*
Balance, being excess of income over expenditure, carried to general balance-sheet		*Cr.* 67,450	*468,738*
		£5,058,878	*£42,099,049*

INCOME.			Total for Year 1940–41.	Total since Inception of Main Highways Act, 1922 to 31/3/41.
			£	£
Loans raised under Main Highways Act, 1922—				
Stock and Debentures issued—				
At 3 per cent. interest			1,746,000	*5,491,725*
At 3½ per cent. interest			..	*677,890*
At 3¾ per cent. interest			..	*190,895*
At 4 per cent. interest			17,605	*1,442,937*
At 4½ per cent. interest			..	*542,005*
Treasury bills and notes—				
At various rates of interest			1,046,975	*2,605,000*
Securities redeemed, Loans Redemption Account			..	*2,850,650*
Consolidated Fund—Public Debt Repayment Account			..	*55,720*
			2,810,580	*13,856,822*
Finance Act, 1932, section 55—Premium on exchange			*Dr.* 121,875	..
Receipts under section 15, Finance Act, 1923, from Public Works Fund, General Purposes Account (at 5 per cent. interest)			..	*1,226,000*
Income from—				
Motor-registration licenses, fees, and fines (section 24, Motor-vehicles Act, 1924)		£ 579,058		
Less Commission on collection by Post and Telegraph Department—	£			
Motor-registration fees and licenses	23,874			
Fees for registration of change of ownership	8,424			
		32,298		
			546,760	*6,512,680*
Interest from investments			439	*218,408*
Interest from local authorities on plant purchased on their behalf			3,530	*34,375*
Interest on advances to local authorities			2,913	*40,009*
Mileage Tax (Finance Act, 1931–32 (No. 2), section 19)			11,197	*42,871*
Miscellaneous receipts			10,653	*15,749*
Motor-spirits tax (section 9, Motor-spirits Taxation Act, 1927)			1,581,793	*17,256,780*
Tire-duty (sections 13 and 14, Main Highways Act, 1922)			62,888	*2,533,273*
Transfer from Consolidated Fund (section 14, Main Highways Act, 1922)			..	*210,000*
Rent of and tolls from ferries			..	*2,082*
Temporary transfers from other accounts			150,000	*150,000*
			£5,058,878	*£42,099,049*

* Excludes £60,408 10s. 7d. interest credited.

NOTE.—No charge for the cost of exchange on interest payments made in London is included in the accounts.

TABLE 5.—MAIN HIGHWAYS ACCOUNT—*continued.*

GENERAL BALANCE-SHEET AS AT 31ST MARCH, 1941.

LIABILITIES.	—	Total.
	£	£
Excess of income over expenditure for 1940–41	*Dr.* 67,450	
Add Balance at 31/3/40	536,188	468,738
Sundry creditors—		
Public Works Department	45,081	
Other Government Departments	4,989	
Non-departmental	153,953	204,023
Interest accrued on loans	..	68,389
Reserves for redemption of securities	..	249
Writing-off in Suspense	..	4,414
		£745,813

ASSETS.	—	Total.
	£	£
Cash in Public Account—		
At call	..	15,931
Sundry debtors—		
Public Works Department	34,862	
Other Government Departments	4,199	
Non-departmental	5,584	44,645
Advances to local authorities (Main Highways Amendment Act, 1926, section 2)	..	73,573
Motor-registration fees in hands of Postal Department	..	7,147
Interest due and accrued	..	2,285
Buildings and land	..	78,567
Stocks of materials, tools, &c.	..	197,609
Furniture, fittings, &c.—		
Expenditure to 31/3/41	938	
Less depreciation to 31/3/41	672	266
Plant and equipment—		
For Main Highways Board—		
Expenditure to 31/3/41	636,157	
Less depreciation charged to works	381,838	254,319
Purchased for local authorities—		
Expenditure to 31/3/41	350,739	
Less repayments of principal	283,931	66,808
Amount transferred to Loans Redemption Account	2,850,899	
Less amount utilized for redemption of securities	2,850,650	249
Stocks Deficits Account	..	4,414
		£745,813

NOTES.—(*a*) No liability is included for interest on loans redeemed out of Public Debt Repayment Account. (*b*) The two funds, previously known as "Construction" and "Revenue," were amalgamated as from 1st April, 1936, and are now termed the "Main Highways Account," in accordance with section 3, Finance Act (No. 2), 1935.

J. W. SCOTT, A.R.A.N.Z., Chief Accountant, Public Works Department.
W. L. NEWNHAM, Chairman, Main Highways Board.

I hereby certify that the Income and Expenditure Account and Balance-sheet have been duly examined and compared with the relative books and documents submitted for audit and correctly state the position as disclosed thereby, subject to the departmental notes enfaced thereon.—CYRIL G. COLLINS, Controller and Auditor-General.

TABLE 6.—LENGTHS OF HIGHWAYS AT 31ST MARCH, 1941.

Number and Name of Highway District.	Type of Surface.			Total.
	Dustless.	Gravel or Macadam.	Pumice or Clay.	
	Miles ch.	Miles ch.	Miles ch.	Miles ch.
1. Auckland North	97 27	742 51	..	839 78
2. Auckland South	690 3	821 28	3 0	1,514 31
3. Tauranga	134 75	332 19	243 53	710 67
4. Gisborne	108 32	288 40	..	396 72
5. Napier	266 57	468 68	..	735 45
6. King-country	61 29	538 31	4 50	604 30
7. Taranaki	362 7	111 30	0 60	474 17
8. Wanganui	190 40	342 26	0 63	533 49
9. Wellington West ..	295 30	227 29	..	522 59
10. Wellington East	170 16	334 25	..	504 41
Totals, North Island ..	2,376 76	4,207 27	252 66	6,837 9
11. Nelson	115 32	560 45	6 41	682 38
12. West Coast	85 53	487 25	..	572 78
13. Canterbury North ..	73 56	318 14	..	391 70
14. Canterbury Central ..	247 41	514 40	..	762 1
15. Canterbury South ..	199 2	635 13	..	834 15
16. Otago Central	153 57	688 72	..	842 49
17. Otago South	123 0	406 17	..	529 17
18. Southland	100 46	828 27	..	928 73
Totals, South Island ..	1,098 47	4,439 13	6 41	5,544 21
Totals, Dominion ..	3,475 43	8,646 40	259 27	12,381 30
		Summary.		
State highways	2,011 68	1,828 28	150 4	3,990 20
Main highways	1,463 55	6,818 12	109 23	8,391 10
Total	3,475 43	8,646 40	259 27	12,381 30

TABLE 7.—TESTS OF STONE COMPLETED DURING THE YEAR ENDED 31ST MARCH, 1941.

Abrasion Tests by the Los Angeles Machine.

(Tests carried out between 1st April and 30th June, 1940, were recorded in the last annual report and are therefore omitted).

Gradings of test-samples are: A, 1½ inches to ½ inch; B, ¾ inch to ⅜ inch.

The Board's Standard Specifications require that the abrasion loss shall not exceed the following figures: Base-course metal, 65 per cent.; top-course, 50 per cent.; sealing-chips, 20 per cent.

Locality.	Grading.	Percentage of Loss.	Geological Classification.
Port Mapua, Nelson	B	50·80	Marble.
Patutahi Quarry, Cook County	A	28·38	Limestone.
Patutahi Quarry, Cook County	B	28·88	Limestone.
Motuhora Quarry, Cook County	B	26·68	Greywacke, shaly.
Brynderwyn, Whangarei District	B	13·78	Greywacke.
Taipa, Whangarei District	B	29·00	Hornblende andesite.
Larmer's Road, Whangarei District	B	26·18	Greywacke.
Green Hill, Whangarei District	B	24·20	Augite diorite.
Bald Rock, Whangarei District	B	25·22	Trachyte.
Te Paki, Whangarei District	A	24·72	Greywacke.
Te Kao, Whangarei District	A	29·04	Greywacke, slaty.
Waiapu River, Gisborne	B	18·46	Greywacke.
White's Bay, Blenheim	B	11·88	Quartzite.
Fox's Island, Renwicktown	B	15·36	Quartzite and Greywacke.
Wangamoa River, Nelson	B	16·18	Greywacke.
Matthew's Quarry, Papamoa	B	21·52	Pyroxene andesite.
Duncan's Quarry, Papamoa	A	20·30	Pyroxene andesite.
P.W.D. Quarry, Athenree	A	38·90	Hornblende andesite.
Tauranga County Quarry, Athenree	B	19·78	Pyroxene andesite.
Wangamoa River, Nelson	A	13·56	Greywacke and andesite.
Wangamoa River, Nelson	B	13·70	Greywacke and andesite.
Motueka Borough Pit, Hursthouse Street	B	18·88	Greywacke, andesite, and sandstone.
Waipara County Quarry	A	13·54	Greywacke.
Cobden Beach	A	15·70	Greywacke and some sandstone.
Cobden Beach	B	15·72	Greywacke and some sandstone.
Nelson Creek, Grey County	A	21·64	Greywacke and sandstone.
17-Valley Stream, Blenheim	A	26·94	Greywacke and sandstone.
Hunua Gorge, Papakura	A	10·58	Greywacke.
Hunua Gorge, Papakura	B	10·02	Greywacke.
Kakariki, Rangitikei River	B	16·12	Greywacke.
Totara Flat	A	23·80	Greywacke, quartz, &c.
North Beach, Greymouth	B	15·56	Greywacke, quartz, &c.
P.W.D. Quarry, Western Springs, Auckland	A	23·94	Basalt-scoria.
P.W.D. Quarry, Western Springs, Auckland	B	23·62	Basalt-scoria.
Waitakere Scenic Drive, Auckland	A	37·26	Melaphyre.
Waitakere Scenic Drive, Auckland	B	37·00	Melaphyre.
Ferndale Road Quarry, Mount Wellington	B	22·52	Basalt, soft.
Smeed's Quarry, Tuakau	A	11·88	Basalt, nepheline.
Smeed's Quarry, Tuakau	B	10·86	Basalt, nepheline.
Stevenson's Quarry, Runciman	A	37·02	Greywacke, fine grain, partly decomposed.
Gulland's Quarry, Mangatawhiri, Pokeno	A	25·90	Greywacke.
Smale's Quarry, Takapuna	A	24·14	Basalt, soft.
Winstone's Quarry, Mount Wellington	B	28·14	Basalt, scoriaceous.
Omahu Shingle Co., Napier	B	16·32	Chiefly greywacke.
Birkenhead Borough Quarry, Takapuna	B	14·54	Basalt.
Wellington Pipe Co., Hutt River	B	13·06	Greywacke.
Palmer's Quarry, Dunedin	B	21·44	Basalt.
Neuchatel Co., Sockburn	B	14·82	Greywacke.
Eltham Borough Council	B	40·96	Andesite.
Waioeka Quarry, 7m., Tauranga District	A	19·22	Andesite.
Nukuhou Quarry, 7m., Tauranga District	A	34·46	Andesite and sandstone.
Tirohia Quarry, Paeroa	A	17·50	Andesite.
Pitangi, Wanganui River	B	22·14	Largely andesite.
Kapuni River, Hawera County	A	39·64	Basalt-scoria.
Hauraki Plains County Council: Orongo-Netherton main highway	A	19·84	Hornblende andesite.

Other tests were made by sieve analysis, and for tension, lineal shrinkage, and soil constants of surface- and sub-grade materials.

By Authority: E. V. PAUL, Government Printer, Wellington.—1941.

354.931
N48
1944/45

NEW ZEALAND

PUBLIC WORKS STATEMENT

1945

BY THE

Hon. R. SEMPLE

MINISTER OF WORKS

WELLINGTON
BY AUTHORITY: E. V. PAUL, GOVERNMENT PRINTER

1945

THE LIBRARY OF THE
SEP

1945

NEW ZEALAND

PUBLIC WORKS STATEMENT

(BY THE HON. R. SEMPLE, MINISTER OF WORKS)

Mr. Speaker,—

It is with feelings of deep thankfulness that, after nearly six years of war, I am able to present this report with the defeat of Japan as well as Germany and her satellite nations in Europe an accomplished fact. It gives me considerable satisfaction to be able to record that the Public Works Department, with which I have been associated for the greater part of the war period, was able to make a not inconsiderable contribution to that end. Apart from the individual overseas services of some 1,336 officers and approximately 3,000 workmen, many of whom attained high rank and filled important administrative and combatant posts, my Department was able to fill an important role in providing technical and specialist services which have contributed their full share in the military achievements of the New Zealand Division which have earned the Division world-wide renown.

I desire to place on record on behalf of myself and their fellow-officers and fellow-workmen our great pride in their achievements.

In last year's statement I referred to the appointment, pursuant to the provisions of the Ministry of Works Act, 1943, of Mr. James Fletcher as Commissioner of Works. Mr. Fletcher resigned from this position on 31st December, 1944, and Mr. E. R. McKillop, Deputy Commissioner of Works, was appointed Commissioner of Works in his stead.

It is fitting here that I should pay a tribute to the work carried out by Mr. Fletcher, first as Commissioner of Defence Construction and later as Commissioner of Works. Mr. Fletcher occupied these positions in a purely honorary capacity, and his splendid services contributed in no small measure to the success of our defence-construction programme. His personal qualities, combined with a wide knowledge of the building industry, resulted in our being able to meet all commitments to the United States and our own Forces, in New Zealand and in the Pacific, for living accommodation and storage requirements, and in such a way that a very large proportion of the buildings erected to meet these needs do, even now, and will more so in the future, have a post-war civilian use.

During the year under review the establishment of the Ministry of Works, the main functions of which were described in my last statement, was completed by the appointment of certain principal officers. As now constituted, it covers the whole constructional field in which the Government is interested. Throughout the year the Commissioner of Works has maintained a continuous review of all construction proposals involving the expenditure of State funds, and it has been his responsibility to see that major works projected were properly co-ordinated and related to both national and regional planning. Priorities have been assessed on the basis of essentiality and availability of materials and man-power. All proposals for construction are scrutinized from both a technical and economic point of view, and throughout its operations the Ministry of Works maintains a close liaison with the Organization for National Development, on which it is directly represented.

The arrangements made ensure that very full information regarding major projects proposed to be carried out by the State or by local authorities with a Government subsidy is centred in the Commissioner's Office. The collation of this information has enabled the Government to have continuously in advance, a clear indication of developmental and constructional projects and accordingly to plan well ahead. Some indication of the extent of the works which to date have been nominated from various sources as deserving attention in the first five years of the post-war programme may be gained by the fact that the total estimated cost of projects submitted so far to the Ministry of Works exceeds £250,000,000. While it is likely that much of this total will, on scrutiny, be found to be well outside the scope of the early post-war period, the fact remains that the figure mentioned relates to works which are suggested to be of sufficient national importance to warrant consideration. The necessity, therefore, for proper selection and planning needs no further elaboration. Apart from works of an urgent character, the accumulation of deferred maintenance is an aspect which cannot be overlooked in the assignment of immediate national priorities, and due allowance is being made for a substantial proportion of the available labour and material to be set aside for this purpose. In the assignment of priorities, although obviously it will be a practical impossibility to give effect to all their recommendations, the authorities interested will be fully consulted.

The Ministry of Works is, of course, particularly interested in such works as the State proposes to carry out. In this connection certain well-defined plans have already been prepared covering such aspects of the Government's responsibilities as are concerned with provision of State houses, hydro-electric extensions, railway improvements, highway bridges, &c., but further work is still necessary before a similar position is reached on other works now under consideration.

Another responsibility attaching to the Office of the Commissioner of Works is the continuous supervision up to completion of the progress and cost of all projects financed by State aid and the elimination of any factors which might tend to retard the realization of the priority plan.

Since the Ministry of Works was constituted it became evident, on account of the considerable interest which the Government itself must retain in major developmental projects in both urban and rural areas, that it was extremely difficult for local authorities to plan within their own areas without knowledge of the Government's intentions. In the past disclosure of the Government's intentions has more often than not had the effect of appreciating the value of land included in the developmental areas, with the result that the State and local authorities have frequently had to acquire land at prices inflated by the betterment conferred by the very works for which the lands had to be acquired. To overcome this position an amendment to the Public Works Act was contained in the Finance Act (No. 3), 1944, which provides that the compensation for lands that will be affected by such proposed works and which the State or local authorities may have to acquire, shall not be inflated by the additional value created by these works. This is a new principle in dealing with land compensation, but it enables the Government's intentions to be published in sufficient detail to form the groundwork for planning in each regional area and enables the value of the land affected, which the State or local authority may wish to acquire, to be stabilized at the values existing at the time the notice was issued. In accordance with the provisions of this Act, I intend, as soon as the necessary investigations are completed and in order to facilitate the work of planning by Regional Authorities, to make known the Government's proposals in regard to major developmental works, particularly in the four main metropolitan centres.

I have endeavoured to make it clear that those people who desire to build their own homes within any of the proclaimed areas will have the opportunity of doing so as soon as the development work has reached a sufficient stage of progress to ensure that the private building conforms to the general scheme and essential services are available. The Government will, in fact, be prepared to dispose of sections for this purpose, and the private owner will be given permission to connect his premises to water and sewerage systems that may be installed.

It has been apparent for some time that because of the development of the Dominion, the nature of the work being undertaken by the State, in particular by the Public Works Department, was changing radically in character. The Department's organization was based largely upon road and railway construction in which the Department, up to recent years, was principally engaged. For the future the State will be faced more with the problems of building, land reclamation, soil conservation, irrigation, the provision of electric power, &c., and on this account it has been necessary to consider some measure of re-organization in the structure of the Public Works Department. The twelve district offices now existing will be amalgamated into six major districts, and to these reconstituted districts greater authority will be delegated from Head Office and more administrative work will be carried out from the districts themselves. It is confidently anticipated that the work of the Department will be carried out more efficiently, more economically, and with greater flexibility when these new districts are set up. Sub-district offices will remain in the main provincial towns so long as the amount of works ahead warrants their retention. In regard to the Head Office of the Department, this also has been reorganized with a view to defining professional responsibilities more clearly than has been possible in the past and with a view to relieving the senior professional officers of non-technical administration, so enabling them to devote more time to professional problems which in the near future will be very considerable.

It appeared also that the Department had reached a stage in its development when a further degree of specialization was necessary, and proposals are now under way to appoint officers who will specialize in certain of the more important fields of the Department's activity. Such officers will maintain continuous inspection of major undertakings and will take the place of the Inspecting Engineers who in the past were required to handle a wide variety of professional problems. As and when convenient, arrangements will be made for these officers to go abroad and attain up-to-date knowledge in such fields as hydro-electric development, harbour improvement, land reclamation, soil conservation, &c., such knowledge to be promulgated throughout the Department on their return.

Specialization is the keynote also of the reorganization of the Administration and Architectural Divisions of the Department.

Simultaneously steps are being taken to remove from the structure of the Public Works Department the Hydro-electric Branch and reconstitute it as a separate Department of State. The commercial activities of this Branch have in recent years grown to such an extent as to render the further retention of an authority principally concerned with the distribution and sale of power undesirable in a Department whose primary function is that of construction.

The reorganization of the Department has been one of the first assignments of the new Commissioner of Works, who was instructed by Cabinet towards the end of last year to undertake this in conjunction with the Public Service Commissioner.

FINANCE

The payments and receipts in connection with the Public Works Account and other associated votes and accounts for the year 1944–45 are shown in the tabulation following.

The expenditure for the year administered through the Department reached a gross total of £21,964,714, of which sum £4,760,761 was on account of the Dominion's defence programme carried out on behalf of the respective Defence Services. The amounts received as credits-in-aid show an aggregate of £4,644,115, leaving net expenditure at £17,320,599.

Revenue collected by the Department totalled £2,598,969 for the year, and of this sum £2,438,748 represents the sale of electrical energy and miscellaneous receipts credited to the Electric Supply Account. The balance is made up of irrigation revenue and miscellaneous receipts exclusive of taxation for Main Highways purposes, which is collected by other Departments.

Class of Work.	Expenditure, 1944–45.		
	Gross.	Credits.	Net.
EXPENDITURE, PUBLIC WORKS ACCOUNT	£	£	£
Public Works, departmental	780,646	596,346	184,300
Railway construction	319,770	52,967	266,803
Housing construction	4,699,282	253,526	4,445,756
Public buildings	460,097	50,196	429,901
Education buildings	477,393	3,605	473,788
Lighthouses and harbour-works	8,994	850	8,144
Roads, &c.	129,494	10,959	118,535
Soil conservation and rivers control	102,789	61,049	41,740
Lands, miscellaneous	44,462	140	44,322
Irrigation, water-supply, and drainage	544,194	210,148	334,046
Linen-flax development	516,048	584,287	*Cr.* 68,239
Ministry of Works	5,398	48	5,350
Totals, Public Works Account	8,088,567	1,824,121	6,264,446
Electric Supply Account—			
Construction	2,897,440	97,326	2,800,114
Working-expenses	738,366	22,183	716,183
	3,635,806	119,509	3,516,297
EXPENDITURE, OTHER VOTES AND ACCOUNTS			
Main Highways Account—			
Annual appropriation—			
Construction, reconstruction, and improvements	125,007	19,419	105,588
Maintenance, repairs, and renewals	1,640,886	138,364	1,502,522
Administration, plant, and miscellaneous expenditure	78,923	59,173	19,750
Interest, fees, &c.	28,947	..	28,947
Permanent appropriations (rate subsidies, interest on transfer from Public Works Fund, &c.)	230,673	..	230,673
Consolidated Fund—			
Maintenance, public buildings, roads, &c.	614,777	110,639	504,138
Plant, material, and miscellaneous services	2,760,367	2,372,890	387,477
Other accounts (expenditure by Public Works Department): Amounts not included above	4,760,761	..	4,760,761
Totals, other votes and accounts	10,240,341	2,700,485	7,539,856
Grand total of expenditure, Public Works Account and other votes and accounts, for the year ended 31st March, 1945	21,964,714	4,644,115	17,320,599

Class of Work.	Receipts, 1944–45.
RECEIPTS,* PUBLIC WORKS DEPARTMENT	£
Ordinary Revenue Account—	
Irrigation (receipts for year)	26,719
Miscellaneous receipts for year	116,980
Electric Supply Account (sales of energy, miscellaneous receipts, &c.): Receipts for year	2,438,748
Main Highways Account (repayment of advances, &c., and interest): Receipts for year	16,522
Total receipts	2,598,969

* Excludes motor-spirits tax, registration fees, &c., collected by other Departments.

Summary

—	Public Works Department.	Other Departments.	Total.
	£	£	£
Gross expenditure	20,971,273	993,441	21,964,714
Recoveries and receipts	6,655,192	587,892	7,243,084

Of the net expenditure of £17,320,599 previously mentioned, £13,848,124 may be regarded as having been expended from loan-moneys (£6,264,446 Public Works Account, £2,762,917 Electric Supply Account, £60,000 Main Highways Account, and £4,760,761 War Expenses Account), the balance—*i.e.*, £3,472,475 being expended from loan recoveries, revenue, and taxation.

The ratio which the various classes bear to the whole is shown below. It should be noted that the figures are gross—that is, before deducting recoveries, which, if deducted, would detract from the true portrayal of activities :—

	£	Per Cent.
Roads, including construction and maintenance of main highways	2,233,930 =	9·09
Hydro-electric (construction and working expenses) ..	3,635,806 =	14·80
Railway construction	319,770 =	1·30
Housing construction	4,699,282 =	19·13
Public buildings, including schools	937,490 =	3·82
Land improvements and soil conservation	147,251 =	0·60
Irrigation, water-supply, and drainage	544,194 =	2·22
Linen-flax development	516,048 =	2·10
Public buildings and roads, &c. (maintenance)	614,777 =	2·50
Plant, material, and services, other Departments	2,760,367 =	11·24
Miscellaneous	795,038 =	3·24
Navy, Army, Air, and Civil Defence expenditure	4,760,761 =	19·38
Revenue receipts	2,598,969 =	10·58
	£24,563,683 =	100·00

Summary of Votes under the Control of the Minister of Works, and proposed Ways and Means of raising the Necessary Funds, Year ending 31st March, 1946

Vote.	Miscellaneous Receipts.	Loans.	Consolidated Fund.	Special Revenue.	Total.
	£	£	£	£	£
Railway Construction	30,000	181,000	..	..	211,000
Housing Construction	500,000	5,090,000	..	..	5,590,000
Public Buildings	35,000	745,000	..	..	780,000
Lighthouses and Harbour-works ..	350	47,000	..	..	47,350
Roads, &c.	10,000	150,000	..	..	160,000
Soil Conservation and Rivers Control	60,000	140,000	..	..	200,000
Lands, Miscellaneous	..	44,040	..	..	44,040
Irrigation, Water-supply, and Drainage	150,000	490,670	..	..	640,670
Electric Supply	100,000	3,682,735	..	1,217,265	5,000,000
Main Highways	150,000	483,818	..	1,456,182	2,090,000
Maintenance of Public Works and Services	470,000	..	1,596,000	..	2,066,000
Totals	1,505,350	11,054,263	1,596,000	2,673,447	16,829,060

For the current financial year 1945–46 a sum of £1,596,000 will be provided from the Consolidated Fund for expenditure on the purchase of plant and on maintenance of public works and services. The expenditure on main highways (including permanent appropriations estimated at £243,818) is estimated to reach £2,333,818, of which a sum totalling £1,700,000 is expected to be raised by way of special revenue. It is estimated that revenue from the supply of electrical energy will reach a sum of £2,800,000, which will be utilized for the payment of sinking fund, interest, income-tax, &c., and operating expenses. Miscellaneous receipts (previously shown as credits-in-aid) for all votes are estimated at £1,505,350.

DEFENCE WORKS

The principal activities of my Department on behalf of the Services comprised constructional works arising from increased naval requirements in connection with the Pacific theatre of the war. In this respect considerable extension work at certain existing bases has been pushed forward with all expedition. With regard to Army and Air Services, the utilization of buildings and equipment no longer required in New Zealand and the Pacific has received special consideration, and, where practicable, these have been appropriated for the war or civilian needs. The Commissioner of Works has been closely associated with the Services in considering and determining the reallocation and disposal of these assets. Only a limited amount of work has been necessary for the Army and Air Force in New Zealand, and this has consisted mainly of adjusting existing camps, installations, air establishments, &c., to the modified conditions which obtain as a result of the favourable developments in the general war situation.

It is now possible to reveal the extent of the work undertaken by this country on behalf of the Allied Forces in the Pacific area, the figures quoted being additional to those already disclosed in respect of constructional activities within the Dominion. Prefabricated buildings involved an expenditure of £1,300,000 and fixed installations cost £1,600,000, a total of £2,900,000.

By maintaining a close liaison with the Allied authorities in the Pacific it has been possible for New Zealand to purchase considerable quantities of construction plant and equipment no longer required in that theatre and which when reconditioned will be most useful as replacement for some of the equipment which was released by this Dominion in the early stages of the war. No less than 555 items of construction plant, valued at over £500,000, were sent overseas to the Middle East, India, the Far East, Fiji, and the Pacific generally. A very large proportion of this machinery, of course, has been lost to the Department.

Although the construction phase of defence works has passed, the services of my Department are still being utilized to a considerable degree in connection with the release of land which has been occupied by the Forces, the disposal of surplus war assets, and the settlement of legitimate claims arising from the use of land for various defence purposes throughout the Dominion. Assistance is being given regularly to the War Assets Realization Board in regard to the demolition and disposal of buildings and materials according to instructions issued from time to time by the Board.

HOUSING

During the past year a tremendous demand has been made of the building industry, and this demand has increased progressively during recent months. Over the last quarter applications for permits to build houses, both by private and public enterprise, have been received at the rate of approximately 900 a month, nearly 3,000 in excess of the record year, 1939.

It must be borne in mind that the great bulk of our man-power of the age group twenty to thirty-five years is still in the Armed Services, and until these men can be released and building and allied industries can be rehabilitated serious difficulties in supply are likely to occur.

Obviously, therefore, the erection of houses is limited only by the availability of materials and man-power.

Even when released ex-servicemen do become available it naturally takes some considerable time for them to re-adjust themselves. One of the main bottlenecks is timber supplies, and in practice it has been found that many returned servicemen are reluctant to go back into the bush.

The inability of overseas countries to supply manufactured and raw materials essential to the servicing of houses also creates difficulties. On these countries we have to depend for such materials as galvanized iron, steel, non-ferrous metals, water-pipes, soil pipes, electrical materials, glass, paint ingredients, nail wire, &c., a shortage of any one of which creates serious repercussions.

During the year 1,969 State houses were completed, and at the close of the year a further 3,442 houses were under construction in various parts of the Dominion.

In rural areas 467 temporary and 82 permanent dwellings were in hand for farmers who had applied for rural accommodation through the Primary Production Councils.

In addition, contracts for 130 houses had been arranged for returned servicemen placed on farms through the Rehabilitation Department, and these also included the provision of milking-sheds, implement-sheds, wool-sheds, and piggeries.

MAIN HIGHWAYS

Owing to several contributing factors it has not yet been possible to restore highways surfaces back to the high standard that existed prior to the outbreak of hostilities, but a considerable amount of resealing work is planned for the coming season, and every effort will be made to have this important work carried out.

There has been a small increase in the length of bridges renewed during the year as compared with the previous year, but a comprehensive programme lies ahead and work will be put in hand and completed just as fast as skilled labour and materials become available.

Plans are in course of preparation covering the improvement of several lengths of State highways adjacent to the larger centres of population, and these works will receive consideration in the post-war programme.

SOIL CONSERVATION AND RIVER CONTROL

During the year under review the election of members to the six Catchment Boards already constituted was held in conjunction with the 1944 local authority elections. These Boards are now devoting themselves to the immediate problems of administrative organization and of investigating the needs of their districts preparatory to formulating proposals for submission to the Soil Conservation and Rivers Control Council.

I have emphasized on many occasions the magnitude of the task which confronts this Dominon if we are to arrest the deterioration of land through ill-conceived use and the continued exposure of areas to the destructive elements of nature.

Although the problem is urgent it is very important to establish the ultimate soundness and value of remedial schemes so that once a plan has been adopted we can anticipate with confidence the progressive execution of that plan to the eventual benefit of the nation.

The loss of valuable land by erosion of all kinds has been going on over the centuries, and it will be a matter of many decades in some cases before restoration of that land becomes fully accomplished.

Honourable members may rest assured that the recurring problem of river flooding is receiving close attention, and it is hoped that as soon as the availability of man-power and plant will allow, comprehensive control schemes will be launched in order to deal with some at least of the major rivers.

It will be appreciated, therefore, that the absence of new works in this respect does not represent inactivity, but rather should be taken as evidence that careful planning is still proceeding.

The Soil Conservation and Rivers Control Council has embarked upon an educative and informative programme so that the public will realize the seriousness of the country's need and the importance of the Government's policy as expressed in the legislation. Special films and publications have been sponsored by the Council, and these have already met with an encouraging reception. The keen interest being displayed by the Catchment Boards is most gratifying and indicates a commendable desire on their part to share in this great national work.

HYDRO-ELECTRIC DEVELOPMENT

Although shortages of man-power, wartime restrictions in the use of materials, and the difficulties experienced in obtaining additional plant which has been on order for some time have all been well known to the public during recent years, the effect of the past five years of war is now brought home to our citizens with stern reality in so far as electricity supply is concerned. The development which was planned to meet the anticipated increase in demand for electricity has been retarded through the factors I have mentioned, and restrictions in the use of power have had to be imposed in order to keep the demand within the supply capacity.

It had been planned that the Karapiro Scheme (90,000 kW.) in the North Island and the Tekapo Scheme (25,200 kW.) in the South Island would be completed by 1943, but, for reasons well known to all, work had to be suspended on both of these projects early in the war period.

To ascertain if there was any prospect of improving the situation temporarily by utilizing suitable fuel-driven plants, the Inspecting Electrical Engineer of the Department was sent overseas to investigate the position in relation to this proposal and at the same time to explore the possibility of expediting the delivery of generating plant on order. Although he was successful in obtaining some adjustments in delivery to ensure that sections of plant might arrive in better sequence than formerly appeared likely, he was unable to obtain any general improvement in deliveries or secure any suitable alternative generating plant. Indeed, despite every effort made, the promised delivery of certain items has deteriorated since the beginning of this year.

Nevertheless, despite all difficulties, the generating capacity of the national system has been increased during the war by 37 per cent., some 82,000 kW. of plant having been installed and put into commission since 1939. In addition, the Highbank Station (25,000 kW.) on the South Island system has been brought into service for the winter of 1945.

At the Cobb River Scheme construction and erection of penstocks was completed, and after satisfactory test the generating plant was put on commercial load early in the year. Supply to the Golden Bay and Waimea Electric-power Boards and the Golden Bay Cement Co. was given on 6th June, 1944. The 66 kV. transmission-line to Blenheim was completed in December, and supply was given to the Marlborough Electric-power Board on 1st January, 1945.

During the year contracts were let for the equipment for the next generating station on the Waikato River - Maraetai (180,000 kW.), and also for the major equipment required for the 220 kV. substations at Otahuhu and Bunnythorpe.

Owing to departmental circumstances arising from the war, it has not been found possible to include an audited statement of the Electric Supply Account with this report, but the matter is now in hand, and the statement, duly audited, will be included in paper B.–1 [Pt. IV] in terms of section 57 of the Finance Act, 1932.

RAILWAY CONSTRUCTION

Work on railway construction has not been of an extensive nature due to prevailing conditions and the approach to completion of works in hand. Satisfactory progress under present circumstances has been made with individual works.

Remedial measures have been pushed forward on the Turakina and Fordell tunnels, and more than two-thirds of the work has been completed. At the same time the work of completing the deviation has been proceeded with as labour was available. At Wangaehu four spans of the bridge were launched successfully, and the overbridge and approaches were completed.

Work on the South Island Main Trunk Railway is being continued as expeditiously as the plant and labour available will allow. During the year the large bridge-building programme was completed. A gap of only 2 miles 30 chains separates the two ends of the line, and the work required to join these sections comprises plate-laying and ballasting. There is still a considerable amount of work to be carried out on the tunnels and other structures before the line will be completed. However, some of that work can be carried out under traffic and need not necessarily delay the opening of the line for through traffic.

In conjunction with rapid housing developments in the Hutt Valley the extension of the double track railway has made good progress and the formation has been extended from Waterloo to Taita, while other related works are in hand.

ROAD CONSTRUCTION

Owing to war conditions it has not been possible to undertake any comprehensive scheme of construction. Minor works have been completed and surveys and investigations of future roads, largely of a developmental nature, have been undertaken as staff was available. Unfortunately, extensive damage due to flooding has taken place in South Canterbury and Otago as the result of abnormally heavy rainfall.

IRRIGATION AND WATER-SUPPLY

The season has been again an unfortunate one from an irrigation point of view. Heavy rains have been experienced throughout the irrigating season and, apart from lowering the demand for water, have resulted in increased maintenance costs due to flood damage to the schemes.

In Canterbury, although the schemes have suffered in a similar manner to those in Otago, the year under review has been marked by some noteworthy achievements. The Rangitata Diversion Race was completed, and for the first time water was conveyed from the Rangitata to the Rakaia River, a distance of 42 miles. At the outlet to the Rakaia the Highbank Power Station was almost completed during the year under review, and it has since been completed and opened for operation. This is a most welcome addition to the hydro-electric supply.

Work on the Mayfield-Hinds Scheme, which when complete will irrigate 78,000 acres, has been resumed and will be pushed ahead as more labour becomes available.

Regular investigations are being carried out not only on irrigation works, but also on other water-supply proposals so that adequate data may be available for considering further schemes if necessary. In these times the potential increase of food production by irrigation cannot be overstressed, and to assist in this I have arranged for the Irrigation Engineer to investigate the best and most advanced methods abroad and to study conditions generally relative to this important matter.

LANDS IMPROVEMENT

This important productive work also has had to be curtailed due to the shortage of man-power and plant. This has been further accentuated by having to utilize plant in repairing flood damage and on other urgent works.

Reclaimed areas have been improved at Ruawai and Naumai by the raising of stop-banks. In the north, farms have been benefited by the extension of water reticulation. A limited programme of sand-dune reclamation has been undertaken, and in this field an improved organization is in course of being built up for future work.

Records kept of land-clearing activities show the importance of this work, and in practically all cases where full advantage has been taken of the cleared areas considerably increased production has resulted.

COAL PRODUCTION

During the year my Department has assisted the Mines Department in every way possible with the production of coal from opencast mines in various parts of the country from the Waikato to Southland, and a great amount of work has been carried out with heavy plant. Access has been provided, large areas stripped of overburden, camps erected, and sidings, bins, and loading arrangements constructed. In addition, the coal itself has been excavated, and in many cases this has been done under very difficult climatic conditions.

LIGHTHOUSES

Little new work has been carried out during the past year. All structures and equipment have been maintained in a high state of efficiency, and, in general, living conditions have been improved by improving access, in some cases by road, in others by sea, and the modernizing of sewage disposal and water-supply services.

PLANT AND MECHANICAL

The period under review has been largely one of reorganization and transition from the demands of the war period to the preparation for the post-war programme of works. The zoning control system established some eighteen months ago has proved its worth, particularly in times of emergency, such as during the recent disastrous floods in South Canterbury.

A considerable amount of plant is being returned from the Armed Services, and during the past year I arranged for the Chief Mechanical Engineer to visit America in order to arrange purchase of mechanical equipment and to study the latest methods of applying plant units to construction work generally. It was found that great interest was taken in the United States of America in the success of the zoning scheme now functioning in my Department.

Plant has been made available as required to assist other Departments in respect of important national works of various kinds. Owing to the difficulty of importing special plant during the war period the Department has designed and successfully constructed certain equipment urgently required such as a radial cableway at Karapiro and large-capacity concrete-mixing plants.

In connection with river-control projects which must feature largely in the remedial measures to be adopted in order to alleviate economic losses due to major flooding, special excavating machinery has been secured from the United States of America, where experience over many years has demonstrated their suitability and efficiency. In the process of widening, deepening, straightening, and diverting river channels, particularly of the larger waterways in the Dominion, a considerable amount of earthwork will be involved, aggregating millions of cubic yards of material, and it is recognized to be more economical to use suitable large-capacity machines for this purpose than to employ a number of relatively small units.

Two special-type tower excavators of the largest capacity so far produced in the United States of America have therefore been obtained which, because of their particular features, offer valuable advantages over the equipment hitherto used in this country. By reason of their operating range and height, combined with a bucket capacity of 12 cubic yards per lift over a span of 800 ft. to 1,000 ft. and a facility in dumping and trimming material, these machines will accomplish in one process what would otherwise require a series of operations by an assembly of smaller units. A particular advantage in the height and span of the towers is that the equipment will not readily be subjected to interference from river conditions during operations.

The first of these machines is now being assembled in preparation for operations on the Otaki River below the main highway and railway bridges. The head tower is 130 ft. high and the tail tower approximately 30 ft. in height. The control cabin, which is part of the head tower, is 60 ft. above ground level, and this enables the operator to direct the work with uninterrupted view. For shift-work, flood-lighting is provided. The machine is operated electrically either from an independent Diesel generating unit or from the ordinary reticulated supply where power may be available. The excavating buckets vary in size and type, so that the appropriate type can be used according to the particular needs of the locality and the nature of the material to be removed. In favourable country and under suitable conditions the output of one of these installations can be conservatively estimated at not less than 150,000 cubic yards per month based on three shift work for six days per week. A feature of these machines is that the time cycle of a single operation is reduced very considerably below that of other methods, and apart, therefore, from its excavating capacity the time factor in operation contributes materially towards its overall efficacy and economy.

This equipment is of a type and capacity not previously seen in this country, but it is confidently anticipated that in respect of performance, cost, and speed results will be achieved which will prove eminently satisfactory from every viewpoint.

HOUSING CONSTRUCTION SERVICES

In connection with the development of areas to be utilized for the construction of houses, the Public Works Department has undertaken the provision of certain service installations and street works as part of the State housing activities. This has involved a considerable amount of work, particularly in the Hutt Valley, where the service installations have been very extensive in new areas which are being developed for residential use. It was not possible at first to arrange for this portion of the work to be completed prior to the buildings being commenced, but from now on it is anticipated that these services will be available before the building activities are ready to commence.

PUBLIC BUILDINGS

With the virtual cessation of defence construction, activities have been concentrated on urgent civil works, included amongst which are the following :—

Department of Agriculture, for which buildings have been erected in connection with animal research stations.

Education Department.—A new school has been erected at Avondale, and additional accommodation provided at New Plymouth Girls' High School ; Stratford Technical High School ; Wellington Girls' College ; King Edward Technical College, Dunedin ; Balclutha District High School ; and Gore High School.

Health Department.—New or additional hospital accommodation has been provided at Middlemore ; Palmerston North ; Nelson ; Hanmer ; Burwood ; the Soldiers' Convalescent Hospital, Rotorua ; St. Helens Hospital, Invercargill ; and staff accommodation at Kawakawa, Kohukohu, and Nelson.

Internal Marketing Division.—Buildings in connection with State vegetable schemes, dehydration plants, &c., were erected or extended at Pukekohe, Turuturu, Motueka, and Christchurch.

Mental Hospitals Department.—New buildings erected include a male occupational block, Auckland, villas at Porirua and at Waitati, and a medical officer's residence at Porirua, while a start has been made on a large new mental hospital scheme at Lake Alice, near Marton.

Police Department.—Six new police-stations have been or are being built and five police residences provided at various towns throughout the Dominion.

Post and Telegraph Department.—New buildings were constructed or are under construction at Kaitaia, Kaikohe, Newmarket, New Plymouth, Aongatete, Te Kuiti, Lower Hutt, Makara, Island Bay, Seddon, Inangahua Junction, Greymouth, Balclutha, and Wanaka, and several towers have been demolished as a precaution against earthquake damage.

Public Works Department.—Buildings were or are being built at Te Puke, Nelson, Hamilton, Christchurch, and Hororata for various departmental activities.

Railways Department.—New buildings were erected at Blenheim and Kaikoura, the latter including complete station and other accommodation. A large reinforced-concrete goods shed at Christchurch is under construction.

Rehabilitation Department has been provided with accommodation, including offices, training centres, &c., in fourteen centres.

Miscellaneous.—Buildings of all designs and sizes from small stores to large warehouses, from roadmen's cottages to complete camps, offices, workshops, &c., have been erected, extended, repaired, altered, and, in addition, the continuous task of maintenance has been faithfully attended to in spite of difficulties in respect of labour and material supplies.

I wish to acknowledge the continued good services of the staff and workmen of the Department throughout the past year. It is most gratifying to know that within recent months many who have been on active service overseas have returned to New Zealand and will in due course be able to take their place again with the Department in happier circumstances than they have experienced for some years.

While we welcome the home-coming of prisoners of war and all who have been spared to return to our fair land, we regret the loss of every one of those who gave their lives in the cause of liberty and freedom.

APPENDICES

Further information relating to public works carried out during the past year is included in the attached reports by the Engineer-in-Chief, the Government Architect, the Chief Electrical Engineer, and the Director of Housing Construction.

In accordance with section 24 of the Main Highways Act, 1922, the annual report of the Main Highways Board is also submitted herewith, *vide* Appendix E.

As required by subsection (2) of section 33 of the Soil Conservation and Rivers Control Act, 1941, I also submit with this statement the annual report of the Soil Conservation and Rivers Control Council covering the operations of the Council for the year ended 31st March, 1945.

APPENDICES

TO THE

PUBLIC WORKS STATEMENT, 1945

APPENDIX A

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS OUT OF THE PUBLIC WORKS ACCOUNT AND ELECTRIC SUPPLY ACCOUNT FOR THE YEAR 1944–45

Prepared in compliance with Section 8 of the Public Works Act, 1928

Public Works Department, Wellington, 13th June, 1945.

Sir,—

In compliance with the 8th section of the Public Works Act, 1928, I enclose a statement of the expenditure during the preceding financial year on all works and services chargeable to the Public Works Account and the Electric Supply Account.

I have, &c.,
R. Semple,
Minister of Works.

The Controller and Auditor-General, Wellington.

Statement of Net Expenditure on all Works and Services chargeable to the Public Works Account and Electric Supply Account for the Year 1944-45

Summary.	Appropriation.	Gross Expenditure.	Credits in Aid.	Net Expenditure.
Public Works Account	£	£ s. d.	£ s. d.	£ s. d.
Public Works, Departmental	130,500	728,254 6 9	591,845 8 6	136,408 18 3
Railway Construction	364,500	310,992 14 8	52,967 3 2	258,025 11 6
Housing Construction	5,500,000	4,684,243 6 3	253,299 19 7	4,430,943 6 8
Public Buildings	565,000	459,802 7 10	50,196 4 10	409,606 3 0
Education Buildings, &c.	500,000	477,392 16 2	3,604 12 9	473,788 3 5
Lighthouses and Harbour-works	28,500	8,986 4 3	850 9 0	8,135 15 3
Roads, &c.	200,000	128,275 16 7	10,958 18 10	117,316 17 9
Soil Conservation and Rivers Control ..	50,000	101,845 19 10	61,049 4 9	40,796 15 1
Lands, Miscellaneous	68,600	44,458 0 9	140 0 3	44,318 0 6
Irrigation, Water-supply, and Drainage ..	500,000	539,542 8 2	210,147 14 4	329,394 13 10
Linen Flax Development	137,400	493,473 13 8	584,202 6 2	*Cr.* 90,728 12 6
Ministry of Works	7,923	5,004 6 5	48 11 2	4,955 15 3
Unauthorized expenditure: Services not provided for	..	106,296 16 6	4,811 15 1	101,485 1 5
Totals, Public Works Account ..	8,052,423	8,088,568 17 10	1,824,122 8 5	6,264,446 9 5
Electric Supply Account				
Electric Supply	4,255,500	3,595,319 1 0	114,508 19 11	3,480,810 1 1
Unauthorized expenditure: Services not provided for	..	40,487 2 1	5,000 0 0	35,487 2 1
Totals	12,307,923	11,724,375 0 11	1,943,631 8 4	9,780,743 12 7

Note.—This statement includes only the expenditure on works, and does not include expenditure such as interest, sinking funds, and charges and expenses of loans.

J. W. Scott, A.R.A.N.Z.,
Chief Accountant.

W. L. Newnham, M.Inst.C.E.,
Permanent Head.

The Statement of Expenditure charged to the Public Works Account and the Electric Supply Account has been examined and found correct.—Cyril G. Collins, Controller and Auditor-General.

APPENDIX B

ANNUAL REPORT ON PUBLIC WORKS BY THE ENGINEER-IN-CHIEF

The Engineer-in-Chief to the Hon. the Minister of Works.

Sir,—

I have the honour to submit the following report on the various public works completed and in progress throughout the Dominion during the year ended 31st March, 1945:—

RAILWAYS

Turakina–Okoia Railway Deviation.—At the beginning of the year under review investigations and establishment of services were in hand. By the end of May plans for the reconstruction of the tunnels had been received on the job, and since then have been continuously implemented, while the balance of the work required to complete the deviation has been continued as availability of labour permitted.

The duration of the work has been limited to such a short period that accommodation has been largely of a more temporary nature.

The remedial work has been 70 per cent. to 75 per cent. completed in the Turakina Tunnel, and 60 per cent. completed in the Fordell Tunnel.

Four spans of the Wangaehu Bridge have been launched successfully, and the Wangaehu overbridge and approaches completed. The yards and access roads at this station are nearing completion.

Diesel plant has been used where possible to reduce consumption of electricity, and difficulties have been experienced with the supply of skilled labour and materials.

South Island Main Trunk.—Good progress has been made during the year. All bridges have been completed. Plate-laying has been delayed somewhat through lack of sleepers.

As the formation on the Kaikoura section was practically completed last year only minor works and maintenance has been carried out.

The formation of the Hundalee–Puketa section has been completed, 152,000 cubic yards being involved. This also includes trimming, plate-laying, ballasting, and fencing.

Various bridges have been completed this year, notably the Kowhai River Bridge, a 500 ft. long reinforced-concrete girder bridge; the Lyell Creek Bridge, a 458 ft. long reinforced-concrete continuous-girder bridge, with retaining wall; and the Stony Creek Bridge, a 250 ft. long reinforced-concrete girder bridge, with various necessary protection to abutments, stop-banks, and groynes.

Some 1,250 ft. of culvert, ranging from 12 in. to 8 ft. by 8 ft., have been installed.

Station yards are nearing completion, while sea and river protection continues.

Considerable movement in the Oaro Tunnel has led to investigations to determine what strengthening of this and other tunnels is necessary, but no final decisions have yet been reached.

Westport–Inangahua Railway.—Maintenance and overhaul of plant, bridges, and buildings has been carried out, and the Railways Department has now installed automatic signalling.

Paeroa–Pokeno Railway.—A reinstatement survey has been commenced from both ends of this section.

Hutt Valley Railway Extension.—The survey work is now well in hand for the extension, and double-track formation is complete on the Waterloo–Taita section, except for part of station yards. Storm-water drainage, depending as it does on the Housing Department's development adjacent to the line, is not yet complete. Ballasting and platelaying on this section is about 50 per cent. complete.

IRRIGATION

This season has been most unfavourable to irrigation throughout, as well-distributed and heavy rainfall has been experienced both in Central Otago and Canterbury. In addition, maintenance costs have been high as the results of damage caused by the heavy rainfall and flooding. Conditions generally have been mild.

Central Otago.—Small extensions have been made to the Ida Valley Scheme, and the bulk of the maintenance has been repairing storm damage.

The number of irrigators has fallen from 510 in 1943–44 to 443 this year, and out of a total area under irrigation of 53,000 acres, 44,053 acres were actually irrigated in the 1945 season.

The financial statement has reflected the conditions, revenue being £24,700, working-expenses £28,441, a loss of £3,741 in the year's workings.

Canterbury.—This year has been marked by the completion of the Rangitata diversion race, and water was conveyed from the Rangitata River to Highbank, a distance of 42 miles, for the first time in November, 1944. Minor protective works are yet to be done, but this will not affect the flow over the whole length. Again damage has occurred, due to extraordinary flooding. The official opening of the power-station at Highbank will probably be carried out in June.

Ashburton–Lyndhurst Scheme: The land is being prepared for irrigation by the border-dyke system, and race reticulation covering 68,000 acres is now complete.

Mayfield–Hinds Scheme: The construction on this scheme, which will cover 78,000 acres when complete, has been recommenced. Plans and detailed proposals are in hand, and maintenance of the scheme has been continued during the year.

Redcliff Scheme: 60 acres only have been irrigated out of an area commanded of 4,600 acres. The revenue from four irrigators has been £60; expenses, £794.

Levels Scheme: 800 acres have been irrigated out of an area commanded of 12,000 acres. Revenue from 23 irrigators, £133; expenses, £2,065.

Irrigation Investigations.—The regular observation of rainfall, run off, and general meteorological phenomena has been continued. Bores have been sunk to enable records of ground-water movement to be kept. These have already proved valuable in discounting claims in regard to seepage. Further bores have been authorized over an extended area and will be sunk in the near future.

CONSTRUCTION AND IMPROVEMENT OF ROADS

Construction has again only been of a minor amount, due to the general conditions limiting action on these works. Surveys and investigations have been carried out in various areas more recently, with particular reference to access roads to timber areas in order to assist with increased timber production. Unfortunately, in many cases only timber areas will be opened by such roads. Considerable future planning is also in hand.

The work done during the year comprises the following: formation, 38 miles; metalling, 49 miles; completed bridging, 1,270 ft.; culverts, some 2,550 ft. with 2,400 square feet of concrete ford. Maintenance to road surfaces, particularly those subjected to heavy military traffic in the past, has been carried out.

The year has been marked particularly in the south by heavy rain storms and subsequent flooding. Extensive damage has resulted in South Canterbury and Otago. In South Canterbury damage to the extent of some £60,000 to roads and bridges has occurred, and twenty-three bridges have been washed away. The damage in Otago has not been so extensive in this item, but amounts to some £6,000.

HYDRO-ELECTRIC DEVELOPMENT: CONSTRUCTION WORKS

Waikaremoana.—This work is continuing with the best speed that the present man-power conditions, particularly with reference to tradesmen, will permit. The service roads have been maintained, some 7,300 cubic yards of crushed metal being required for this item alone.

Grouting has been continued throughout. 98 cubic yards of grout, making a total of 1,780 cubic yards, have been injected to form a curtain wall near the head gate shafts. Very extensive drilling and grouting has been carried out at the intake section and tunnels. West of headgate shafts, 28,196 ft. of drilling has been done with 3,860 cubic yards of grout injected. No. 1 headgate shaft has been excavated some 70 ft. deep with a clear diameter inside timber of 12 ft. 6 in., but at this depth difficulty was experienced with an extensive water break-through. At present remedial measures are in hand.

Progress has been maintained in the twin tunnels against considerable natural difficulties and under trying conditions for the workmen. Work has proceeded twenty-four per day, mostly on a wet-time basis. The country is very broken, and water has been met with at all stages of the work. 383 ft. of concrete lining in No. 1 and 388 ft. in No. 2 tunnel has been poured this year. The total lengths now lined are 530 ft. and 437 ft. respectively.

Grouting ahead of the faces and behind the linings continued, 28,494 lineal feet of borehole having been drilled up to date, of which 19,500 ft. have been completed this year, and through these bores 6,700 cubic yards of grout has been placed. The evidence of the success of this grouting has been continuously found as the tunnels have been driven through the grouted area.

Seven contractors' drilling-machines and one departmental one have between them drilled a total of 69,449 ft., of which 21,177 ft. was reboring, the average boring rate being approximately 2·5 ft. per minute for contractor's plant and 4·2 ft. per minute for departmental plant.

The total grout used in all sections has been 9,100 cubic yards, representing 3,720 tons of cement. Apart from the above major work, work on the penstocks has been pushed ahead. Excavation is in hand, 16 concrete pedestals have been completed, and steel plate for the fabrication of the penstocks is held. 2,712 cubic yards of concrete have been poured in the power-house foundation alone up to February, and this work should be completed by September. Good progress has been made concreting the floor slabs and walls of the tail-race.

A comprehensive building programme, including school buildings and permanent staff accommodation, has been completed, except for some single quarters.

Karapiro Development.—The excavation of the site, totalling 570,000 cubic yards, has been completed except for minor trimming; and consolidation grouting has been carried out in the intake section, between the penstocks and in the cut-off trench of the arch section of the dam. The two coffer dams were completed about the middle of 1944 and seepage reduced to a workable amount by grouting and sealing with swamp mould. Boring and grouting of the cut-off trench on the up-stream face of the gravity and intake section of the dam has been commenced.

At the end of the period under review the main power-house structure had been constructed to the level of the cable basement floor, without any major difficulties being encountered, while the office block and unloading bay were further advanced, making a total yardage of concrete placed in the section of 16,119 cubic yards. Good progress has been made also with the intake and spillway sections, where after extra excavation 8,637 cubic yards of concrete were placed in the former section from December, 1944, to March, 1945, and 15,500 cubic yards in the latter section. In connection with the spillway section, the syphon flumes are partially completed, and the lower level bridge was completed towards the end of 1944.

The concreting of the arch section was commenced in October last, and up to the end of March, 11,198 cubic yards had been placed with two-thirds of the arch bays under construction. The outdoor station has been completed to the level of the mezzanine and switch-room floor. The total concrete poured in all these operations was 52,578 cubic yards, with 635 tons of reinforcing steel placed.

Additional concrete plant, together with a radial cable way for concreting the arch section and a 10-ton crane, are being provided for the concreting of the dam.

The contract for the penstock steel linings was completed in July, the segments being installed by the Department with the aid of a special 5-ton cableway. The internal welding of the linings is about two-thirds complete, and the installation of the auxiliary penstocks well in hand.

In the permanent village, six more permanent houses have been completed, and five more are in hand. Concrete footpaths and kerb and channelling have been laid, together with a considerable increase in temporary accommodation for workmen.

Miscellaneous road and stream diversions, including bridging, are well forward, and surveys have been completed for the access roading to the new scheme at Maraetai. Road construction has commenced on the Tokoroa end of this access.

The number of men employed has risen during the year from some 600 to approximately 1,000, although a considerable shortage in carpenters still exists.

Lake Coleridge.—The foundations of the outside transformer station have been completed and water mains installed.

Highbank.—This scheme has been completed and should be ready for the official opening in June. Repairs, due to recent flood damage, have been effected. This scheme should be a welcome addition to the present development.

Waitaki.—In order to assist with future development on this river, ten miles of access road have been constructed.

Lake Tekapo.—The first tunnel shield has been completed at the departmental workshops, Temuka, carted to the site, and re-erected for final testing. The fabrication of this shield of 22 ft. diameter, the first of its type to be used in New Zealand, has been a major undertaking by the workshops.

Excavation and lining of the shield-erection chamber is nearing completion, together with other preliminary work. 538 precast concrete lining blocks have been manufactured. The survey for the tunnel has been finished, buildings repaired, and machinery re-installed for a fresh start with the work.

Cobb River Scheme.—This scheme, which went into operation towards the end of June, 1944, has been of the greatest importance to the northern end of the South Island. Tying in with several existing schemes, it has ensured an adequate supply of power in this area. Work continues with the further development of the scheme, principally on the dam-site, where investigations on the bed rock are being carried out. Shafts have been sunk and drives excavated over the site. Difficulties have been experienced with inflow of water, and this has delayed the work on one shaft. The temporary dam and intake were completed in May. A considerable amount of work has been involved in maintaining the access roads due to heavy flood damage. A permanent water-supply has been ensured by the installation of a 20,000-gallon reinforced-concrete tank and pump-house.

LAND IMPROVEMENTS

Due to the man-power and plant shortage, this work has been considerably curtailed. However, it is apparent from the reports from various districts that land has benefited generally by the works carried out provided adequate follow-up measures have been taken by the farmer.

Whangarei.—The Ruawai and Naumai Stopbank, Otamatea County, has been raised for a distance of 6 miles, with considerable benefit to property.

Much record and investigation work has been carried out in regard to water-supply schemes for Dargaville Borough, Hobson, and Otamatea Counties. Stream gaugings and rainfall data have been taken, and reservoir and dam-sites investigated. The local people are taking a fresh interest in the schemes, although some apathy is apparent in one or two areas.

The augmentation of Kaikohe town water-supply extension has been delayed by non-delivery of pumping equipment. The work in hand will, however, complete the scheme. The various schemes operating in this district have been maintained throughout.

Kaipara Harbour.—Reclamation: General maintenance only has been carried out.

Kerepeehi Block.—13,500 ft. of water-piping has been laid in order to reticulate thirty-five farms.

Sand-dune Reclamation.—Reclamation at areas such as Kaipara Heads, Muriwai, and North Waikato Heads and the Hokio-Manawatu district has again been on a limited programme and has been confined largely to maintenance and improvement of existing work. Accommodation and facilities for the staff have been improved. Seedlings have been raised, marram cut and planted out, and fire-breaks established. This, with the erection of firewatching huts and a telephone system, should assist with safeguarding the work.

Land clearing has been carried out in widely scattered areas, but chiefly at Ohakune, Nelson, West Coast, and Southland. Priority demands on plant have prevented more extensive work being done. Records kept of areas previously cleared have clearly shown the importance of this work and provided adequate follow-up measures are taken the results have been most encouraging.

The work generally comprises stumping, logging, rooting, levelling, and ploughing with some access roading. In Southland alone some 4,600 acres have been developed since the work started, involving 55 miles of access road and 35 miles of drainage channels. In the Ohakune area a total to date of 8,600 acres have been stumped at a cost to the country of only £1 per acre, and the result of this work has been reflected in an increase in vegetable production of some 79 per cent. and 11½ per cent. in sheep.

Waimate.—A drainage scheme of 900 acres has recently been completed, with anticipated benefit to the area.

LIGHTHOUSES AND HARBOUR WORKS

Lighthouses

Improvements, renovations, and maintenance of lighthouses and attached buildings have been carried out during the year, together with routine overhaul of equipment. In general, living-accommodation has been made more comfortable and access and services improved.

At Portland Island improvements have been made to the water-supply and landing facilities. The channel and swinging basin have been excavated, and a jetty constructed on the mainland for the launch servicing the island.

At Manakau Heads the new concrete lighthouse has been completed.

Proposals have been made for the repair of the wharf built by the Department at Westhaven Collingwood County.

COAL PRODUCTION

As a new venture the Department has been involved to a greater or lesser degree in the production of coal from opencast mines at Glen Afton, Glen Massey, Waitewhenua, Stockton, and Ohai.

The work carried out has included opening up the sites ; access roading ; stripping coal-bearing areas ; quarrying coal ; provision of plant to Mines Department and contractors ; construction of camps, screens, bins, conveyors, and loaders ; and general supervision. At Glen Afton 222,600 cubic yards of excavation has been carried out, of which 79,600 cubic yards has been done this year for the production of 18,210 tons of coal, of which 12,210 tons represents this year's output.

At Glen Massey 330,260 cubic yards have been stripped for the production of 6,875 tons.

At Waitewhenua 81,357 cubic yards have been stripped for 20,000 tons of coal produced.

The work generally has been made difficult by bad climate conditions and heavy rain.

DEFENCE WORKS

Generally, the work covered under this heading has comprised the completion of works so far advanced as to warrant this course, the making safe of works which it has not been deemed necessary at this stage to complete, and general maintenance of existing works. Some new works necessary to complete a particular scheme have also been undertaken, notably for the Navy Department, where major items have been involved.

Restoration work made necessary by the removal of various defence structures has been carried out, and demolition of other works is well advanced. Camps have been maintained and minor improvements made and essential services extended. Many camps have been handed over to the War Assets Realization Board for disposal, and this has necessitated the assistance of the Stores staff in regard to valuation and disposal.

An internees' camp was converted for the use of Polish children evacuated to this country, and alternative accommodation provided for the previous users of the camp. Work from now on should be confined mostly to maintenance, disposal, and restoration.

HOUSING SERVICES CONSTRUCTION

Construction work, chiefly in the nature of levelling areas, installing services, and forming roads and footpaths, has been continued during the year for the Housing Department. This work has been done principally in the main centres of Auckland, Wellington, and Christchurch. Some idea of the amount of work in levelling and clearing done can be gauged from such a generally level district as Christchurch, where, in connection with the development of seven blocks, 21,500 cubic yards were excavated.

Owing to the large building scheme under construction in the Hutt Valley, a considerable amount of work has been done in this area, and some of the more outstanding figures are given : area of land cleared, 517 acres, with 14 miles of roads formed and metalled and 46,850 square yards of sealing. There have been, in addition, 13,500 square yards of concrete footpath laid, with 1,141 chains of kerb and channelling. Storm-water sewers from 6 in. to 54 in. total 21,000 ft., with the corresponding figure for sanitary sewers, 49,000 ft. Water-supply to the area has resulted in 58,000 ft. of piping from $\frac{3}{4}$ in. to 6 in. being laid. Miscellaneous work has included the construction of a bridge, stop-bank construction, top-soiling of various areas, and the general maintenance of services constructed to date.

The Auckland figures, although on a somewhat smaller scale, are comparable : 32,000 cubic yards of material have been excavated, 12,000 cubic yards of metal used in road construction, and 17,500 gallons of bitumen and tar used in sealing work.

PLANT AND MECHANICAL EQUIPMENT

The demobilization of the home-defence units and the withdrawal of most of the New Zealand Military Forces from the Pacific, has led to the release of a fairly large quantity of assorted Public Works Department plant which has been on loan to the Armed Forces. The limitations imposed by the war on major activities of this branch have not been greatly relaxed during the year, however, but it is anticipated that from now on the increase in the demand for plant and mechanical appliances generally will show a marked increase.

Most of the plant returned from the Armed Forces and generally comprising motor-vehicles, tractors, and earth-moving equipment has been in need of either complete or partial overhaul, and this work has overloaded the capacity of the departmental workshops, the staff of which has largely been depleted by the demands of the Armed Forces. In consequence of this transfer of vehicles no new vehicles have been purchased.

The present equipment in use numbers approximately 7,000 items, ranging in value from £50 to £25,000, and the depreciated value totals £1,071,000.

In order to procure new construction equipment and machine tools for the Department's new workshops, and to enable an up-to-date study of the latest application of mechanical equipment to construction works, arrangements were made for the Chief Mechanical Engineer to proceed to America in August, 1944. As a result two large tower excavators were among the machines purchased, these being primarily for use in river-improvement works, where very large earth-work quantities are involved.

Already many of the machines purchased have arrived in New Zealand, and these will materially assist in the execution of many of the priority works now in hand.

The activities of local bodies being largely curtailed by war conditions has resulted in a limited use of road plant and also a limited amount of assistance with the purchase of plant.

The importance of establishing large, well-equipped workshops in each zone is stressed. The repair workshops already established in various localities have provided an excellent service in so far as has been possible with reduced staff and shortages of spare parts. General field inspection is being regularly carried out with the testing of units under operation, and as soon as opportunity permits this service will be expanded so that the efficiency and economical life of the plant may be maintained at a maximum.

The rehabilitation of returned servicemen and disposal of war assets is likely to be an important part of this Branch's activities in the near future, and already assistance is being given to Government Departments most affected.

ZONING SYSTEM OF PLANT CONTROL

The new scheme of dividing the Dominion into three plant zones has now been in operation for approximately eighteen months, and with the increased control and direction of plant there has been a noticeable increase in the total effective working-hours of the plant.

The system involves the rental of all the Department's plant units from one central plant organization to each individual job. All operating costs are borne by the zone, and a fixed rate of hire for actual working-hours is charged up each month. This system permits accurate estimating of the cost of a work.

Along with this added control, a new system of plant recording covering maintenance, plant performance, and plant replacement, has been instituted, which will result in a large amount of very valuable data being available to the Department covering the replacement and operation of its mechanical fleet.

This zoning system enables priority work to be given the greatest possible plant population, and in case of emergency, as in the recent flood disasters in the South Island, the transfer of necessary plant is expedited. This is the result of the exact location, condition, and mobility of all items of plant being known at all times. The system now in operation is similar in many ways to that in use in Australia, and considerable interest has also been shown in the U.S.A. in the control of what is probably the largest mechanical fleet owned by one organization.

The rates have proved to be very reasonable in general, and in some cases it has been possible to reduce them. The result of these fixed rates has been to largely stabilize plant-hire rates throughout the Dominion.

STAFF

The staff has as usual rendered highly efficient service throughout the year, and I have to thank them for their loyal support. Although our construction programme is lower than it has been for many years, the work is being carried on under greater difficulties than ever, and the resources of the Department have been severely taxed.

Proposals in regard to the reorganization of the Department have added to our difficulties, but these will be overcome in due course.

I am again pleased to welcome back to the Department a number of the staff who have returned to the Department after long and arduous service with the Armed Forces.

The surrender of Italy brought to a conclusion a campaign in which many of our staff played a distinguished part, and their work has been recognized by a number of awards and decorations.

I have, &c.,

W. L. NEWNHAM, M.Inst.C.E.,
Engineer-in-Chief.

APPENDIX C

ANNUAL REPORT ON BUILDINGS BY THE GOVERNMENT ARCHITECT

The GOVERNMENT ARCHITECT to the Hon. the MINISTER OF WORKS

SIR,—

I have the honour to submit the following report on the activities of the Architectural Branch for the year ended 31st March, 1945.

With the virtual cessation of defence construction, the activities of this Branch have been concentrated on works of a more permanent nature. The following figures show the relation of defence works to civil works:—

Capital cost of defence buildings	£1,004,000
Number of men employed (average)	755
Capital cost of civil works	£523,000
Number of men employed (average)	408

In addition, sketch plans were prepared for buildings and ancillary works of a total estimated value of £1,553,000.

Wherever possible and when suitable, use has been made of buildings formerly erected for Service purposes, the records and information of the War Assets Realization Board being available for this purpose.

My officers are also called on to assist with professional advice and technical investigations in connection with earthquake damage and restoration, with the Commissioner of Works, the War Assets Realization Board, the Standards Institute, the War Damage Commission, and with research work, and schemes submitted to the Local Government Loans Board for report and examination. The closest liaison is maintained with the Housing Division, the Building and the Timber Controllers, whose officers co-operate with mine in a most satisfactory manner, their services being utilized to the full in a consultant capacity.

In addition to defence works, the following works were carried out:—

Department of Agriculture.—Accommodation has been fitted up at Hamilton East for the Ruakura Animal Research Station, and a start was made with the erection of an animal research station at Manutuke, near Gisborne, whilst work was also carried out at the Upper Hutt Poultry-farm.

Education Department.—At Avondale a new school has been built, a teacher's residence was built at Turangi, and a new wing was added to the New Plymouth Girls' High School. Extensions were made to the engineering block of the Stratford Technical High School, and alterations and additions were made to the hostel at the Wanganui Technical College. A woodworking class-room was erected at Te Aute College. At Massey College additions and alterations were made to the dairy factory, the wool-store, and to the milking sheds and yards, and the addition of a laboratory effected. Two additional laying-sheds were completed. At the Wellington Girls' College an old wooden class-room was demolished, the gymnasium shifted, and a start made to build a new two-storied class-room block in reinforced concrete and brick; whilst site preparation for an intermediate school at Lower Hutt was completed. A memorial library is being built at Feilding, and earthquate damage was made good at the Wellington South School. A sectionalized school at Motueka was dismantled and re-erected at Cobb River, and at the Richmond Special School for Girls additions were made to the hospital annexe. At Lincoln College a new lodge for the Director is approaching completion; eight new poultry-houses were built. Additions are being made to the King Edward Technical College, Dunedin, an assembly hall was built at the Balclutha District High School, and additional accommodation was provided at the Gore High School.

Health Department.—Two residences for nurses were built. The Kawakawa Nurses' Home was completed and alterations and renovations made to a building at Kohukohu for a nurses' home. A large hospital scheme is approaching completion at Middlemore, Auckland. Extensions were made to the massage block at the Soldiers' Convalescent Hospital, Rotorua, and the out-patients' block at Palmerston North Hospital was completed. At Nelson Hospital a two-story ward block was completed providing space for sixty-seven beds, and a two-story nurses' home is under construction. At Queen Mary Hospital, Hanmer, a male massage block was built, additions made to the women's pavilion for a quiet room, and the women's dining-room increased by half. At Burwood a start was made with emergency ward No. 2. Alterations and additions to the St. Helens Hospital, Invercargill, are under way. Several huts were provided for T.B. cases amongst Natives.

Industries and Commerce.—Alterations were made to the linen-flax factory at Washdyke, and the erection of additional buildings is in hand.

Internal Marketing Division.—Extensive buildings have been erected and added to at the Pukekohe Dehydration-factory and workers' accommodation provided. Two glasshouses were erected at Mangaturere. A packing and grading shed and mess-room were built for the State vegetable-production scheme at Turuturu. At Motueka a number of buildings were erected for the dehydration-factory comprising large two-story main building, boiler-house, garage, fuel-house, and vegetable-store, and a large hostel in wood was erected from buildings transferred from an Air Force ground station. At Christchurch a dehydration-factory, including boiler-house, administration building, garage, cafeteria, and sodium store, have been erected.

Justice and Prisons Department.—Additions were made to the Te Awamutu Courthouse to provide a strong-room and a Magistrate's room. A tobacco-curing barn at the Waikeria Borstal Institute is about half completed. Further buildings were erected at Arohata Borstal Institute.

Mental Hospitals Department.—At Auckland a new male occupational block, No. 3, was erected and equipped, sundry farm buildings and an occupational workshop completed ; the erection of an occupational class-room was commenced. Work has commenced on the new Lake Alice scheme, near Marton, tenders being accepted for two villas each accommodating fifty patients, eight staff cottages, and the water-tower ; a Public Works Department office, cookhouse, and two-men huts have been erected. At Porirua three single-story villas in timber have been built, and the erection of another two, each of two-stories and of reinforced concrete, commenced. The female wing of the old building was demolished and a start made to demolish the male wing and the east ward. A house for the Medical Officer is under construction. A small substation is being erected at Sunnyside, and at Waitati a new villa is in course of erection. Parapets and other faulty work were removed at Seacliff.

Mines Department.—Public Works Department workmen's huts have been erected at Waitewhena State Mine, and miners' camps have been erected at Wilton Collieries, Glen Massey, and at Renown Collieries, Rotowera.

Native Department.—Eight cottages were built in the Whangarei district.

Police Department.—A motor-garage was built at Birkenhead, the office and cells block at Eltham was shifted to a new site and renovated, and accommodation for women was provided at the Auckland Station. New stations were built at Te Kaha and Ashhurst, a new station completed at Oxford, and new stations are under construction at Westport and Kerepeehi. Alterations and additions were made to the stations at Taumarunui, Te Kuiti, and Waikouaiti, and at Geraldine extensive renovations and repairs were carried out. At Dunedin a new block is being erected at the rear of the central station. Earthquake damage has been made good at the Headquarters Building, Wellington. At Lower Hutt the residence was shifted and additional accommodation was provided. New residences were built at Te Aroha, Westport, and Riversdale.

Post and Telegraph Department.—A new post-office was erected at Kaitaia, and a new post-office at Kaikohe is in course of erection. A reinforced-concrete garage was built at Newmarket, and the aeradio buildings at New Plymouth were extended. A new post-office is under construction at Te Kuiti. In Wellington, earthquake damage was made good at Te Aro and the General Post Office, in the latter case involving the removal of the statuary. The new post-office at Lower Hutt was completed, the radio station at Makara was also finished, and a commencement made to build a new telephone exchange at Island Bay and a carrier telegraph building at Seddon. A new post-office was built at Inangahua Junction, and an aeradio station at Greymouth. The tower at Greymouth Post-office is in course of demolition, and the tower at Kaiapoi was demolished. At Balclutha a new line-store and garage was built and will be used as a temporary office during the erection of the new post-office. A new post-office was built at Wanaka. The Invercargill clock-tower was removed, and the tower at the Bluff is being demolished.

Public Works Department.—A store, workshop, and switch-house were erected at Te Puke Substation. A reinforced-concrete office block and garage for the Hydro-electric Division were built at Nelson, a large administration building for that Division is being erected at Hamilton, and a switch-room, workshop, and store is under construction at Aongatete. An extensive plant depot is under construction in Christchurch. A garage was built at Hororata Substation, and several cottages for surfacemen and others erected at various localities.

Railways Department.—At Blenheim a new office and extensive additions to the goods-shed were completed. At Kaikoura the new railway-station, goods-shed, engine-shed, residences, and other buildings were erected. The erection of the new goods-shed, a large reinforced-concrete structure, at Christchurch is well advanced.

Rehabilitation Department.—Offices were fitted up at Whangarei, Kaikohe, Napier, New Plymouth, Hawera, Wanganui, Greymouth, and Westport. Trade-training schools were fitted up at Kaikohe, Auckland, Gisborne, Petone, Blenheim, and Westport, whilst at Auckland and Dunedin disabled servicemen's training centres were completed, and at Christchurch the building is well advanced; at Auckland special arrangements for blind ex-servicemen have been made with separate accommodation.

Scientific and Industrial Research Department.—Buildings were erected at Palmerston North for the Grasslands Division.

Tourist and Publicity Department.—Fire damage at Mount Cook was made good, extensive alterations were carried out to provide staff accommodation, and general improvements effected.

Miscellaneous.—At Pahiatua a complete camp has been remodelled to accommodate the Polish refugees. A large store has been erected at Aotea Quay for the Ministry of Supply. Extensive camp accommodation was fitted up at Avondale, Tamaki, and Waikaraka Park for various groups of workers. Wool-stores have been provided at Sylvia Park, and additional buildings in Wellington were built for the Social Security Department. Accommodation has been provided and furnished in various localities for the Land and Income Tax Department. The old buildings known as Bellamy's were demolished and a new restaurant block was erected, the law-draughting block was reconstructed, and additional accommodation provided for the Prime Minister's Department. General maintenance was attended to and alterations and additions were carried out where required.

In conclusion, I wish to put on record my appreciation of the continued loyalty and efficient service of my staff and the co-operation of the staffs of other Divisions and Departments and of the master builders and their organizations.

I have, &c.,

R. A. Patterson, F.N.Z.I.A., F.I.A.A.,
Government Architect.

APPENDIX D

ANNUAL REPORT OF THE CHIEF ELECTRICAL ENGINEER

The Chief Electrical Engineer to the Hon. the Minister of Works

Sir,—

In conformity with the provisions of section 15 of the State Supply of Energy Act, 1917, I have to report on the development of electric power in the Dominion for the year ended 31st March, 1945, as follows:—

In spite of the limitations imposed by the scarcity of man-power and materials, some progress was made with further construction, and the capital outlay on the development of electric supply at the close of the year 1944–45 was £26,277,759, an increase of £2,667,408.

The restrictions upon the use of electricity in the North Island, to which I referred in my report last year, are still in force, but nevertheless the consumption of electrical energy exceeded the allocations of power given to the electric supply authorities. Fortunately there were no serious difficulties in meeting the demand, mainly due to the exceptionally good hydraulic conditions at Waikaremoana. For the coming year, however, there is little doubt that the electric-supply position in the North Island will become more difficult. By June we should have a further 20,000 kW. generating-unit operating at Arapuni, but unless water-supplies at the hydro stations are as good as they were last year, the loss in power output from the Waikaremoana stations will be no more than overtaken by the added output from Arapuni.

The metering of electric hot-water services, which is one of the means whereby waste of electrical energy can be obviated, has been pushed ahead by the electric supply authorities as fast as man-power and materials allowed, and by the end of March some 75 per cent. of the total number installed in the North Island had been metered. As a further means of conserving power the Government and the electric supply authorities jointly subsidize consumers' costs in having thermostats fitted to water-heaters which were installed before July, 1943, when the Electric Water-heating Order was gazetted.

North Island Electric-power System

1. *Capital Outlay.*—Total expenditure to 31st March, 1945, was £16,859,146, of which £3,266,982 was not yet in operation. Details will appear in parliamentary paper B.–1 [Pt. IV] when audited.

2. *Financial Results.*—As was the case last financial year, the effect of the various restrictions is now apparent in the revenue returns. Owing to shortage of staff due to the war, the final results of operation are not yet available.

3. *System Operation.*—Owing to the excellent hydraulic conditions there was no marked shortage of power and generally little trouble was experienced. At King's Wharf Station 34,576 tons of coal were consumed, and at the end of the year 7,957 tons remained in stock.

The maximum half-hour load on the system was 292,900 kW. (last year, 272,200 kW.), and occurred between 1730 and 1800 hours on Tuesday, 4th July, 1944, an increase of 7·6 per cent. on last year. The highest Saturday load was 258,200 kW. (235,500 kW. last year), between 1730 and 1800 hours on Saturday, 10th June, 1944. The frequency was low over this peak, however, and the assessed peak for the period is 266,000 kW. The highest Sunday load was 233,900 kW. (last year, 224,000 kW.), between 1130 and 1200 hours on Sunday, 23rd July, 1944.

The greatest weekly generation was 32,534,000 units (last year 30,810,000), for the week ended 27th August, 1944, an increase of 5·3 per cent. The maximum daily output was 4,946,000 units (last year, 4,681,000), on Tuesday, 22nd August, 1944; the greatest Saturday, 4,400,000 units (last year, 4,289,000), on Saturday, 8th July; and the greatest Sunday, 3,946,000 units (last year, 3,801,000), on Sunday, 6th August.

The total system generation for the year was 1,532,000,000 units.

4. *Construction.—Power-stations:* Arapuni: The work of erecting No. 6 turbine and generator was continued, and it is expected that this unit will be in service in the 1945 winter.

Karapiro: Steady progress was maintained with the excavation and concreting of dam and power-house, erection of penstocks and outdoor station. Some of the plant for permanent installation has arrived, but delivery dates have been again put back on account of war priorities taking precedence with the British manufacturers.

The erection of new houses was completed.

Maraetai: Tenders for the generating plant and major equipment for this station have now been accepted, the contracts being awarded to British, American, and Canadian manufacturers.

Waikaremoana (Upper): Some of the equipment for permanent installation has arrived.

Substations: A new substation at Te Puke to give supply to the Tauranga Power Board's southern area of supply was completed, whilst a commencement was made on the erection of a new station at Aongatete. The transformer capacity was increased at Bunnythorpe, Gisborne, Tahekeroa, Maungatapere, Kaitaia, Belmont, Hamilton, Huntly, Matamata, Wairoa, and Ngongotaha to keep pace with the growing demand. New cottages were erected at Takapuna, Edgecumbe, Hamilton (4), Ngongotaha, and Waihou.

Contracts were placed with British, American, Canadian, and New Zealand manufacturers for the major equipment required at the proposed 220 kV. substations at Otahuhu and Bunnythorpe. These stations are planned to interconnect the future generating-stations on the Waikato River with the present system.

The Central Park Station was almost completed, and supply to the Wellington City Council will probably commence in May, 1945.

Transmission-lines: The second 110 kV. line between Arapuni and Ongarue and the 50 kV. line between Edgecumbe and Te Puke were completed. The erection of the 110 kV. lines between Hamilton and Waihou and Karapiro and Hamilton, and the 50 kV. lines between Arapuni and Maraetai and Bombay and Waiuku, is proceeding.

Good progress is being made with the survey of the permanent route of the 110 kV. line from Bunnythorpe to Tuai, and a contract was let for the supply of the steel towers required.

Reconnaissance surveys have been made of the northern portion of the Otahuhu–Whakamaru–Bunnythorpe 220 kV. line.

5. *Maintenance.*—The usual high standard of supply was maintained, despite the many difficulties brought about by wartime conditions. As in previous years, lightning was again responsible for a number of transmission interruptions.

6. *Organization.*—With a view of increasing efficiency and keeping closer contact with distributing authorities, the two existing districts Hamilton and Palmerston North were reduced in size by the establishment of separate administrative organizations at Auckland and Napier.

SOUTH ISLAND ELECTRIC-POWER SYSTEM

1. *Capital Outlay.*—The capital expenditure on the South Island system (which now includes Cobb Scheme) totalled £9,418,613 at the end of this year, as compared with £8,759,647 at the 31st March, 1944. Details will appear in parliamentary paper B.–1 [Pt. IV] when audited.

2. *Financial Results.*—A steady increase in revenue comparable to previous years has been maintained, but final figures are not yet available.

3. *System Operation.*—The maximum demand on the Department's stations increased by 14·4 per cent., from 103,070 kW. last year to 117,890 kW., and the system maximum demand—*i.e.*, with Waipori Station interconnected—was 134,684 kW., an increase of 10·5 per cent. As a precautionary measure against overload at peaks, auxiliary stations were operated during June and July. From 5th to 12th December and also on 22nd January it was again necessary to call on the standby stations owing to the failure of Nos. 3 and 4 units at Waitaki. The failure of No. 3 unit was the result of lightning.

The maximum flow recorded in the Waitaki River was 57,747 cusecs, on 22nd February. At Lake Coleridge the levels ranged between 1,671·45 ft. and 1,673·95 ft.

4. *Construction.—Power-stations:* Highbank: The stator and other equipment in replacement of that lost at sea in 1940 did not arrive here until late in the year. Consequently this station was not ready for service as anticipated. Work is now well advanced and the unit will be ready for commercial load in time for the winter demand.

Tekapo: The electrical reticulation system was rebuilt and extended preparatory to the resumption of civil construction. Orders were placed for the generating plant and major items of equipment for this station.

Coleridge: The erection of the new outdoor structure was commenced.

Substations: The installation of auto-transformers and the erection of a synchronous condenser at Hororata was completed, thus bringing the reconstruction and reorganization of this station to a conclusion.

Five cottages for operating and maintenance staff were erected at Addington.

Regulating transformer control panels were installed at Winton.

Transmission-lines: The survey of the Gore–Invercargill 66 kV. line was completed, plans prepared, and structures located.

5. *Operation and Maintenance.*—The supply to consumers was not as free from interruption as in previous years, but nevertheless its reliability and continuity was still of a very high standard.

Repairs were effected to Nos. 3 and 4 units at Waitaki, and No. 5 unit at Coleridge was restored into service in August. At Monowai the damage to the control-panel wiring and switchboard instruments caused by the failure of an ironclad machine feeder O.C.B. when in service was expeditiously attended to.

6. *Retail Supply (Southland).*—Total sales to all consumers increased by 2,168,270 kilowatt hours, or 6·2 per cent.

Supply over new rural extensions was made available during the year to 220 new consumers, with connected load of 3,100 kW.

The following table gives a comparison of unit sales and costs to domestic, commercial, and industrial consumers over the years 1936–37, 1943–44, and 1944–45:—

—	1936–37.		1943–44.		1944–45.	
	Units.	Cost per Unit.	Units.	Cost per Unit.	Units.	Cost per Unit.
		d.		d.		d.
Domestic	5,739,138	2·70	8,493,215	2·04	9,152,261	2·00
Commercial	1,961,202	3·03	4,756,578	1·79	5,201,659	1·68
Industrial	8,112,392	0·92	8,144,322	1·00	8,369,773	1·00

The term "commercial" includes shops, street lighting, milking-motors, and other rural power, &c.

7. *Cobb River Scheme.*—Construction and erection of penstocks was completed, and after satisfactory test the generating plant was put on commercial load early in the year. Supply to the Golden Bay and Waimea Electric-power Boards and the Golden Bay Cement Co. was given on 6th June, 1944. The 66 kV. transmission-line to Blenheim was completed in December, and supply was given to the Marlborough Electric-power Board on 1st January, 1945.

The system maximum demand was 5,400 kW., and occurred at 1930 hours on 28th January. The system output was 19,540,739 units, and transmission and distribution losses were 5·3 per cent.

The generating plant required considerable attention for the first six months of service, but all other power-station and substation equipment and all transmission-lines operated satisfactorily and only the normal amount of maintenance work was necessary.

A survey party has commenced work on a reconnaissance survey to explore the best route for connecting the Cobb Scheme with the South Island network via the West Coast.

Registration of Electrical Wiremen

Examinations were held for electrical wiremen, electrical servicemen, radio servicemen, radio transmitters, cinematograph operators, and luminous-discharge-tube servicemen.

Special examinations were again held in the Pacific and Middle East areas for members of the Armed Forces.

Credit tables dealing with electrical experience obtained by electrical apprentices and other personnel whilst in the Armed Forces were prepared and distributed, and have proved valuable in enabling a uniform assessment of credit to be granted, irrespective of in which Service the experience has been obtained.

For the September, 1944, examinations, 625 candidates sat, which constituted a record, the previous highest number being 600 candidates in September, 1929.

During the year the Registration Board assumed full control of the actual conduct of the examinations, this work having previously been carried out by the Education Department.

Consideration of the experience of prospective rehabilitation trainees has figured largely in the business of the Board during the year, and will continue to do so as demobilization proceeds.

Design Office

Structural Section

Further preliminary planning was carried out for Tekapo and Maraetai Power-stations on receipt of tender data and drawings from the contractors for the machinery. Other design work for power-stations included control-room alterations at Waikaremoana Main Station, structural alterations at Lake Coleridge to suit new outdoor station, and two-stall and seven-stall concrete garages at Cobb River. The latter, which are for rental to the operating staff, are very necessary in view of the isolation and the unfavourable climatic conditions.

Switch-room buildings were designed for Greytown, Marton, Pahautanui, Upper Hutt, and Waiuku Substations, and a new workshop building for Mangamaire Substation. Plans were prepared for a workshop at Nelson Depot, and for a furnace-room at Hamilton administrative building.

Drawings and specifications were prepared for a new hostel at Highbank and for additional staff quarters at Bombay and Dobson. Other staff accommodations was designed by the Housing Department.

Electrical Section

The requirements of lightning-arresters for all districts were investigated and essential data for specifications was prepared.

The cable requirements for all districts were scheduled for the annual bulk order for cable.

The metering procedure at all power-stations was investigated, and a uniform metering scheme developed for all installations.

Numerous short-circuit calculations were carried out in connection with inductive interference calculations and investigations of circuit-breaker rupturing duties.

Inspection of locally manufactured transformers was made at various times.

Preliminary designs were prepared for 220 kV. switching structures sufficient to determine the quantity and type of equipment required for Maraetai, Whakamaru, Otahuhu, and Bunnythorpe. Drawings of the various items of equipment were prepared for specification purposes. A preliminary structure layout was prepared for Otahuhu Substation to determine the amount of land required. Preliminary layouts were also prepared to confirm the suitability of a site at Haywards for a future 220 kV. substation in the Wellington area.

The equipment required for 220 kV. transmission made it necessary to investigate transport problems. Arrangements were made with the Railways Department for the construction of a special well-type wagon capable of carrying a load 20 ft. long by 10 ft. 6 in. wide by 12 ft. high and weighing 40 tons. Essential specification data was prepared for the ordering of a well-type road trailer of similar capacity. In the case of equipment for the new substation at Bunnythorpe it will be necessary to use road transport from Wellington to Paekakariki and rail transport between there and Bunnythorpe, because the loads are too large for some of the railway tunnels and too heavy for the road bridges at the Waikanae, Otaki, and Ohau Rivers.

With the large amount of design and construction work in view in the near future it was felt that some form of standardization was necessary, and a considerable amount of time and effort was expanded in compiling a folder of over sixty standard drawings. These drawings refer mainly to the details of construction wiring and layout of equipment inside the substation building and have already had considerable application.

Communications.—Considerable work has been done in planning for future facilities required by the expansion of the power system.

Drawings and specifications were prepared for the supply of carrier-telephone equipment. Specifications were prepared for the supply of power-line carrier equipment for communication, telemetering, and relay protection. Specifications have also been prepared for the supply of automatic-telephone networks for installation at Waikaremoana and Karapiro.

Design work has been completed on standard equipment units which will be fitted into standard substation cubicles. These units will care for the switching and protection of the lines and also cover the relays, filters, and associated equipment connected with the installation.

Preliminary consideration was given to the future requirements of channels for telegraphy, telemetering, remote indication, and supervisory control, particularly in connection with the needs of future system operation.

Hydraulic Section

Work on the Karapiro Dam and structures is virtually complete.

General features and dimensions of the Maraetai Dam and associated structures are being worked out.

Details of the Waikaremoana Upper development and lake control have been carried on and proposals developed as conditions become apparent.

The Cobb penstock and distribution system were completed and tested before going into service.

Work on Highbank was completed in time for the station to operate during the winter.

Details of Tekapo intake, tunnel, and other works are now being prepared.

Investigation and Project Planning.—Work on the Waikato has been concentrated on the Maraetai project, where detailed surveys have been made on the banks and in the river. Foundations have been examined by bores, shafts, and drives, and tested for strength and other physical and chemical properties. An extensive search was made for sand and stone suitable for concrete aggregate, and many tests have been made to determine their suitability.

Studies have been made of minor schemes below the three major developments at Waikaremoana.

In the South Island studies have continued in the upper Clarence River, at Black Jack's point on the Waitaki River, and in the Clutha River above Roxburgh. Reports are being obtained on the geological structure of those areas and of the quality of the foundation rocks.

Some progress has also been made in testing foundations for the Cobb River dam.

I have, &c.,
F. T. M. Kissel, B.Sc., M.I.E.E., A.M.I.C.E.,
Chief Electrical Engineer.

APPENDIX E

TWENTY-FIRST ANNUAL REPORT OF THE MAIN HIGHWAYS BOARD

The Hon. Minister of Works, Wellington.

Sir,—

In accordance with requirements of section 24 of the Main Highways Act, 1922, the Main Highways Board has the honour to submit its twenty-first annual report for presentation to Parliament.

The report covers the period 1st April, 1944, to 31st March, 1945.

General.—As was the case last year, the shortage in the supply of metal chips has held up sealing work in several localities, and until more crushing-plants are in operation throughout the country it seems inevitable that there must be a continuing lag in the sealing programme.

The length of maintenance sealing carried out during the year was 152½ miles, but it is very much below requirements, and unless some early improvement can be shown it is possible that sealed highways will be reverting to macadam roads.

The length of new sealing completed was 33¼ miles, which is 6¾ miles less than that carried out the previous year; and 2,239 lin. ft. of bridges were erected, which is an increase of 607 ft. over the previous year, but 23,322 ft. less than the Board's peak year of 1938–39.

A large programme of bridge renewals lies ahead, but sufficient skilled labour is not at present available, and it appears that this factor will be a delaying influence over the next few years.

Local bodies are experiencing great difficulty in obtaining suitable timber for the repair of the smaller bridges, and this also is causing some concern. The adequate maintenance of highways under local-body control is only being carried on under the greatest of difficulties through the lack of suitable plant, chiefly graders. Some improvement in the import position covering this type of plant would be of assistance to practically all local authorities, who, generally speaking, have been unable to obtain any new plant since the commencement of hostilities and are consequently compelled to use old plant that has long since proved uneconomic.

It is anticipated that the revenue position for the year will show an improvement over last year's figure, but the Board is concerned over the amount of outstanding interest due to the Consolidated Fund and which now amounts to £897,580.

Personnel.—It is with deep regret that the Board has to record the death of Mr. F. R. Flatman on the 3rd June, 1945. Mr. Flatman, who was one of the members representing the New Zealand Counties' Association, was appointed to the Board on 28th July, 1942, and brought to the Board a wide knowledge of county administration.

Works.—The principal works carried out in the various districts during the year are as follows:—

In the Whangarei district nine bridge renewals, totalling 597 ft. in length, were completed. These comprised one bridge on the Whangarei–Awanui State Highway, five on Pakaraka–Awanui via Mangonui Highway, two on Hikurangi–Marua Highway, and one on the Kaikohe–Maungatapere Highway.

In addition, bridges totalling 1,875 ft. in length were under construction at the close of the period, and of these, 1,098 ft. were almost completed.

Maintenance sealing was completed over 7¼ miles of existing paved surfaces, and a programme of systematic grading and metalling was carried out to maintain the unsurfaced highways in good order.

In the Auckland district principal attention has been given to upkeep of sealed surfaces, and some 18 miles of maintenance sealing was completed during the year. In addition, almost 9 miles of reconstruction was completed ready for surfacing and 11 miles reconstructed and sealed. The development and application of soil-testing methods to highway bases due for reconstruction has given excellent results.

Work on bridge renewals in this district during the year has been slight owing to the continuing diversion of design and construction staff to urgent defence works. New bridges completed totalled 46 ft., and 158 ft. was in hand at close of period.

Although a considerable length of maintenance sealing was contemplated during the year in the Tauranga district, available supplies of sealing chips permitted the completion of only 6 miles.

On the Whakatane–Gisborne State Highway placing of 1,000 cubic yards of rock and willow protection was necessitated by a large washout in Waimana Gorge.

In the Gisborne district advantage was taken of a long spell of dry weather to concentrate on the repairs of flood damage caused the previous year. This work was principally river protection and metalling, 19,500 cubic yards of metal being spread on State highways and 9,000 on main highways. Some 600 ft. of pipe culvert was installed and 1¼ miles of resealing work completed.

Early in the period extensive flood damage occurred in the Napier district, affecting particularly the Napier–Gisborne via Hangaroa and Napier–Taupo State Highways. This necessitated removal of some 80,000 cubic yards of slips and spreading of 7,000 cubic yards of metal.

During the year 4¾ miles of maintenance sealing and ¾ mile of new sealing was completed and 4 miles of State highway reconstructed in readiness for sealing.

One bridge renewal was put in hand during the year on the Taupo–Napier State highway and major repairs carried out on two large main-highway bridges.

In the Taumarunui district the principal work was maintenance of metalled highways. This absorbed some 20,000 cubic yards of metal on both State and main highways.

A 12-mile section of the Piopio–Tatu Main Highway was widened and strengthened extensively to give improved access to the opencast coal-mining operations in that vicinity.

During the year 2¼ miles of maintenance sealing was completed and 2¼ miles of the Te Kuiti – New Plymouth State Highway was reconstructed and sealed.

In the Taranaki district 19¼ miles of maintenance sealing was completed during the year, some 14 miles of this being on State highways.

Approximately 4,000 cubic yards of metal was spread to maintain the metalled sections of State highways and over 3,000 cubic yards used to strengthen shoulders on existing sealed surfaces.

Some flood damage was sustained during December on State highways, and this has been made good.

An increase of 4½ miles in the sealed lengths of highway in Wanganui district was achieved by the sealing of 3 miles on National Park–Wanganui State Highway and by the existence of 1½ miles of sealing on the newly declared Waiouru–Tokaanu Main Highway.

In addition, 16¾ miles of maintenance sealing was carried out, and one bridge replacement completed—viz., Torupapa River Bridge on the Pipiriki–Raetihi–Ohakune Main Highway, length, 152 ft.

In Wellington districts attention has been given mainly to holding existing sealed surfaces. Some 44 miles of maintenance sealing has been completed during the year. Of this, approximately half is on State highways.

A length of 2 miles of the Porirua – Titahi Bay Main Highway, which was badly damaged by military traffic, was reconstructed ready for sealing, and 5½ miles of the Foxton–Shannon Main Highway, which carried detour traffic during construction of the Whirokino Bridge, was metalled.

Bridges completed during the year totalled 1,056 ft., and included the 590 ft. Whirokino Bridge over the Manawatu River on the Wanganui–Levin State Highway, as well as the Ruamahanga River Bridge of 332 ft. on the Martinborough-Masterton Main Highway. Several large concrete-box culverts were constructed to replace small bridges due for renewal, and at close of the period bridges totalling 440 ft. in length were under construction.

During the year in the Nelson district the renewal of two bridges was completed. They are the Clark River Bridge (80 ft.) and the Coal Creek Bridge (45 ft.), both on the Nelson–Westport State Highway, and the combined length of approaches constructed amounts to 25 chains. In addition, a temporary bridge was built to replace Jubilee Bridge, near Motueka, on Richmond–Collingwood State Highway, which collapsed when struck by a truck, and considerable repairs were carried out to one pier of the Wairau River Bridge on the Blenheim–Nelson State Highway.

Six miles of maintenance sealing was completed during the year, all on State highways, and some 19,000 cubic yards of maintenance metal spread in all. On the Renwicktown–Summerlands Main Highway 8½ miles of new sealing was completed.

On the Picton–Christchurch State Highway reconstruction of 2¼ miles near Spring Creek was commenced, portion of the base course being laid.

Considerable flood-damage restoration at Woodhen Bend on the Nelson–Westport Highway was carried out.

The year was one of the most consistently wet periods recorded in the West Coast district, and this occasioned considerable flood damage and some deterioration of highways.

A length of 3½ miles of maintenance sealing and 64 chains of new sealing was carried out, the latter on the Greymouth–Waiho State Highway.

Four bridges of total length 195 ft. have been completed, as well as bridge and culvert approaches for these and for previously completed structures. Two further bridges are now under construction.

In North Canterbury 90 chains of the Picton–Christchurch State Highway and 3¼ miles of the Hawarden–Heathstock Main Highway were resealed, and a contract for a further 5 miles of this work near Kaikoura has been awarded.

Replacement of a small bridge on the Picton–Christchurch Highway at Tin Hut Creek by twin-pipe culverts is in hand.

At Kaiapoi, on the same highway, construction of a 160 ft. bridge over the north branch of the Waimakariri was about one-third completed at close of the period. Near this site preparatory work for erection of the projected overbridge has been in hand.

In the Mid-Canterbury district some eight miles of maintenance sealing was completed during the year.

On the main south highway between Winchester and Temuka two deviations totalling 40 chains in length were formed and metalled.

Maintenance sealing in the South Canterbury district totalled 49 chains for the year.

Considerable flood damage was sustained by highways in South Canterbury and Otago districts towards the close of the period.

In Central and South Otago districts a total length of approximately 9 miles of maintenance sealing was completed during the year, despite the interference of flood conditions with the sealing season.

On St. Bathan's Loop Highway replacement of a timber bridge with a 40 ft. concrete structure was put in hand, and on the Milton-Queenstown State Highway the construction of ¾ mile of concrete footpath was completed adjacent to Roxborough.

In Southland district 4¾ miles of maintenance sealing has been carried out in Gore and Bluff Boroughs lengths of State highways. On the Queenstown–Invercargill State Highway between Branxholm and Burtons Corner 2½ miles of new sealing was completed, and four small concrete bridge renewals of a total length of 68 ft., together with 30 chains of approaches.

General maintenance and a steady programme of metalling has been maintained as permitted by man-power, &c.

Contacts with Local Bodies and Automobile Associations.—During the latter part of the financial year covered by this report the Board visited the North Auckland, Auckland, and Tauranga Highways Districts for the purpose of inspecting the highways and conferring with local bodies and motoring interests.

This was the first tour of inspection made by the Board since the commencement of the war in Europe, and it can be said that, chiefly speaking, the Board found the condition of highways better than they expected, and, although maintenance had not been kept up to first-class standard in several localities, it was fairly reasonable under the circumstances.

During the conferences with local authorities the Board was unable to agree to recommend the declaration of additional highways at the present time, but promised to review all applications just as soon as the Board's financial position allowed it to accept additional responsibilities.

The Board is grateful for the co-operation given by local authorities and automobile associations during the difficult years of the European war, and looks forward to continuation of the same good relations in the future.

Magnetic Truck.—During the year this machine has been in operation clearing aerodromes and military camps in the North Island; also sweeping main highways when travelling between the various defence depots. The machine is also hired when requested to local authorities and private concerns for the same purpose—that is, to pick up all puncture-producing materials.

During the year the weight of puncture-producing articles picked up on defence works was 8,842 lb., on highways 8,386 lb. (over a distance of 2,887 miles), and on local-body and private areas, 6,505 lb. The average weight of material picked up on highways in the North Island for the year has therefore been 2·95 lb. per mile, as compared with the previous years average (for both the North and South Islands) of 1·43 lb. per mile.

Since September, 1944, there has been a trailer-type magnet operating in the South Island. The weight of puncture-producing articles picked up to 31st March, 1945, on defence areas was 580 lb., on highways 1,767 lb. (over a distance of 2,038 miles), and on local-body and private areas 980 lb.

The average weight of material picked up on highways in the South Island for the period mentioned above has therefore been ·867 lb. per mile.

Sign-posting.—The amount expended by the Board during the year in subsidizing the erection and maintenance of road signs by the Automobile Association of New Zealand was £2,888.

Examination for Foremen and Overseers of Road Construction.—The eighteenth examination for Foremen and Overseers of Road Construction was held on the 6th December, 1944, when 16 candidates presented themselves for examination.

Thirteen papers on general road construction and maintenance and 9 papers on tar, bituminous, and concrete-road construction were returned. Seven candidates were successful in passing Paper No. 1, while 6 candidates passed Paper No. 2. One candidate passed the full examination, and a further 3 who had previously secured a partial pass completed the examination.

The 8 candidates who were successful in one paper only were credited with a partial pass.

The Board appreciates the valuable assistance given by the Public Works Department in matters relating to highways administration, and extends its sincere thanks to the officers concerned.

Signed on behalf of the Main Highways Board:

W. L. Newnham, M.Inst.C.E., Chairman.

MAIN HIGHWAYS ACCOUNT

Statement showing Particulars of Net Expenditure on Construction, Renewals, Maintenance, etc., for the Year ended 31st March, 1945, and Total to Date

—	Construction and Improvement of Main Highways.		Renewals of Main Highways.		Maintenance, Repairs, &c., of Main Highways.		Totals.	
	Total for Year 1944–45.	Total since Inception of Main Highways Act, 1922, to 31/3/45.	Total for Year 1944–45.	Total since 1/4/36 to 31/3/45.	Total for Year 1944–45.	Total since Inception of Main Highways Act, 1922, to 31/3/45.	Total for Year 1944–45.	Total since Inception of Main Highways Act, 1922, to 31/3/45.
Highway District—	£	£	£	£	£	£	£	£
No. 1	8,754	*1,420,256*	51,914	*228,448*	91,700	*1,246,511*	152,368	*2,895,215*
No. 2	47,863	*2,838,858*	5,771	*178,050*	156,612	*2,283,722*	210,246	*5,300,630*
No. 3	6,347	*932,649*	626	*67,710*	128,055	*1,397,267*	135,028	*2,397,626*
No. 4	*Cr.* 9	*637,750*	98	*81,331*	59,054	*964,589*	59,143	*1,683,670*
No. 5	10,556	*831,854*	5,801	*72,451*	108,155	*1,437,562*	124,512	*2,341,867*
No. 6	8,679	*810,180*	170	*24,890*	61,799	*962,104*	70,648	*1,797,174*
No. 7	1,236	*916,823*	58	*37,308*	55,717	*893,238*	57,011	*1,847,369*
No. 8	3,405	*975,791*	17,444	*53,798*	73,599	*1,004,573*	94,448	*2,034,162*
No. 9	2,034	*1,467,647*	35,265	*101,366*	71,260	*1,102,143*	108,559	*2,671,156*
No. 10	325	*424,892*	13,145	*84,106*	37,403	*805,333*	50,873	*1,314,331*
Totals for North Island	89,190	*11,256,700*	130,292	*929,458*	843,354	*12,097,042*	1,062,836	*24,283,200*
No. 11	9,494	*1,018,617*	6,203	*24,518*	76,773	*1,019,383*	92,470	*2,062,518*
No. 12	9,536	*1,064,478*	13,533	*117,996*	109,470	*1,603,161*	132,539	*2,785,635*
No. 13	7,112	*348,686*	2,638	*7,584*	32,117	*454,731*	41,867	*811,001*
No. 14	3,025	*854,858*	9,469	*16,004*	41,317	*664,520*	53,811	*1,535,382*
No. 15	1,668	*553,675*	2,942	*15,039*	39,228	*729,357*	43,838	*1,298,071*
No. 16	944	*879,434*	162	*13,425*	47,500	*618,916*	48,606	*1,511,775*
No. 17	699	*835,394*	661	*14,993*	36,954	*545,341*	38,314	*1,395,728*
No. 18	2,440	*1,018,897*	3,420	*42,092*	45,430	*727,393*	51,290	*1,788,382*
Totals for South Island	34,918	*6,574,039*	39,028	*251,651*	428,789	*6,362,802*	502,735	*13,188,492*
Totals for Dominion	124,108	*17,830,739*	169,320	*1,181,109*	1,272,143	*18,459,844*	1,565,571	*37,471,692*

MAIN HIGHWAYS ACCOUNT—*continued*

Income and Expenditure Account for the Year ended 31st March, 1945, and Total to Date

EXPENDITURE.		Total for Year 1944–45.	Total since Inception of Main Highways Act, 1922, to 31/3/45.
		£	£
Net expenditure on construction, renewals, maintenance, &c. (see separate statement)		1,565,571	*37,471,692*
Administration—	£		
Administration expenses (including salaries, travelling-expenses, office rents, printing, stationery, postages, and miscellaneous expenses)	63,263	..	*1,472,530*
Fees and travelling-expenses of members of the Main Highways Board other than Government members	873	..	*23,005*
Miscellaneous expenses—			
Advertising, maps, rent of halls, traffic tallies, transport of samples, depreciation of furniture, &c.	19	..	*5,910*
Compassionate grants to widows and relatives of deceased employees	..	..	*4,000*
Compensation under section 3, Public Works Amendment Act, 1925	..	..	*1,015*
Exchange on remittances	..	..	*9,887*
Grant to Transport Department towards Traffic inspection	..	..	*42,906*
Petrological laboratory and other experimental work, expenses of	682	..	*17,071*
Total administration		64,837	*1,576,324*
Loan charges—			
Charges and expenses of raising loans, management charges of Consolidated Stock on account of Construction Fund, &c.	..	..	*88,080*
Interest on amount appropriated out of Public Works Fund and paid into Main Highways Account Construction Fund	49,040	..	*882,720*
Interest on loans, recoupment to Consolidated Fund (section 4, Finance Act, 1919)	467,278	..	*3,614,961*
Transfer to reserve for redemption of main highway securities	..	..	*1,252,130**
Payment to local authorities in commutation of toll-gate charges (Finance Act, 1925, section 20)	1,518	..	*37,798*
Payment to Wellington City Council in commutation of fees chargeable in respect of motor-vehicles using Hutt Road (Hutt Road Act, 1939, section 6)	12,501	..	*397,421*
Total loan charges		530,337	*6,273,110*
Subsidies, &c., in respect of other than main highways—			
Municipal Corporations (Municipal Corporations Act, 1933, section 71)	32,395	..	*439,463*
County Councils and other local authorities (Finance Act, 1930, section 37)	183,292	..	*2,561,388*
Subsidies to County Councils for rebate to ratepayers (Finance Act (No. 4), 1931, section 45)	..	..	*253,893*
Subsidy on rates levied on farming land (Finance Act (No. 3), 1934, section 28)	..	..	*363,887*
Maintenance and construction of roads giving access to outlying areas (Finance Act (No. 3), 1931)	..	..	*45,918*
Total subsidies		215,687	*3,664,549*
		£2,376,432	*£48,985,675*

INCOME.	Total for Year 1944–45.	Total since Inception of Main Highways Act, 1922, to 31/3/45.
	£	£
Loans raised under Main Highways Act, 1922, and National Development Loans Act, 1941 (at 4 per cent. interest)	60,000	*11,741,918*
Securities redeemed, Loans Redemption Account	..	*1,313,613*
Consolidated Fund—Public Debt Repayment Account	..	*55,720*
Receipts under section 15, Finance Act, 1923, from Public Works Fund, General Purposes Account (at 4 per cent. interest)	..	*1,226,000*
	60,000	*14,337,251*
Revenue transferred from the Consolidated Fund	1,773,286	*33,399,642*
Interest from investments	..	*218,444*
Interest from local authorities on plant purchased on their behalf	408	*39,249*
Interest on advances to local authorities	855	*46,477*
Miscellaneous receipts	5,005	*30,697*
Transfer from Consolidated Fund (section 14, Main Highways Act, 1922)	..	*210,000*
Rent of and tolls from ferries	..	*2,082*
Balance, being excess of expenditure over income, carried to General Balance-sheet	536,878	*701,833*
	£2,376,432	*£48,985,675*

* Excludes £61,482 9s. 11d. interest credited.

MAIN HIGHWAYS ACCOUNT—*continued*

General Balance-sheet as at 31st March, 1945

LIABILITIES.	—	Total.	ASSETS.	—	Total.
	£	£		£	£
Consolidated Fund: Interest due	..	897,580	Cash in Public Account—		
Sundry creditors	..	171,110	At call	..	4,968
			Sundry debtors	..	29,281
			Advances to local authorities (Main Highways Amendment Act, 1926, section 2)	..	19,594
			Motor-registration fees in hands of Postal Department	..	11,366
			Interest due and accrued	..	523
			Buildings and land	..	88,539
			Stocks of materials, tools, &c.	..	133,704
			Furniture, fittings, &c.—		
			Expenditure to 31/3/45	927	
			Less depreciation to 31/3/45	754	
					173
			Plant and equipment—		
			For Main Highways Board—		
			Expenditure to 31/3/45	654,113	
			Less depreciation charged to works	588,571	
					65,542
			Purchased for local authorities—		
			Expenditure to 31/3/45	367,935	
			Less repayments of principal	354,768	
					13,167
			Excess of expenditure over income for 1944–45	536,878	
			Balance at 31st March, 1944	164,955	
					701,833
		£1,068,690			£1,068,690

Notes.—(*a*) No liability is included for interest on loans redeemed out of Public Debt Repayment Account. (*b*) The two funds, previously known as "Construction" and "Revenue," were amalgamated as from 1st April, 1936, and are now termed the "Main Highways Account," in accordance with section 3, Finance Act (No. 2), 1935.

J. W. Scott, A.R.A.N.Z., Chief Accountant, Public Works Department.

W. L. Newnham, M.Inst.C.E., Chairman, Main Highways Board.

I hereby certify that the Income and Expenditure Account and Balance-sheet have been duly examined and compared with the relative books and documents submitted for audit and correctly state the position as disclosed thereby, subject to the departmental notes enfaced thereon.—Cyril G. Collins, Controller and Auditor-General.

APPENDIX F

THIRD ANNUAL REPORT OF THE SOIL CONSERVATION AND RIVERS CONTROL COUNCIL

The Hon. Minister of Works.

Sir,—

In accordance with the requirements of section 33 of the Soil Conservation and Rivers Control Act, 1941, the Soil Conservation and Rivers Control Council has the honour to submit its third annual report for presentation to Parliament.

The report covers the period 1st April, 1944, to 31st March, 1945.

General

The Council met on seven occasions during the year, and as was the case last year it is necessary to report that the restriction imposed by wartime conditions has limited constructional activities to works of particular urgency and to the maintenance of existing works. Details of the more important of these works and of the Council's general activities are referred to under their respective headings.

Catchment Boards

The election of members for the six catchment districts referred to in the last report was held in conjunction with the 1944 local-authority elections, the first meetings of the Boards being held shortly afterwards, and were attended by representatives of the Council. These Boards have since been busily engaged in preliminary administrative detail and in making a thorough reconnaissance of their respective districts. As is the case in most new activities, some administrative difficulties have arisen, and the Council has decided to hold a conference of delegates from all Boards and to discuss these difficulties and also policy questions bearing on future activities. The conference is to be held shortly.

Catchment Districts

The following catchment districts were constituted during the year in terms of section 34 of the Soil Conservation and Rivers Control Act:—

Rangitikei, comprising generally the whole of the area embracing the catchments of the Rangitikei, Turakina, and Wangaehu Rivers.

Poverty Bay, comprising generally the area bounded in the north by the northern watershed of the Waiapu River and including the catchments of all rivers to the south down to and including the watershed of the Maraetaha River.

Westland, comprising the whole of the counties of Grey and Westland, together with that part of the Inangahua County which drains into the Grey River.

Southland, comprising generally the area draining into the sea from east of Waikawa Harbour to the west coast and including the whole of the catchments of the Mataura, Oreti, Aparima, and Waiau Rivers and extending to the west to include all Fiord County.

The following is a complete list of the districts which have been constituted:—

Name.	Area (approximate).	Capital Valuation (approximate).	Population (approximate).	Headquarters of Board.
	Square Miles.	£		
Rangitikei	2,756	16,200,000	26,470	Marton.
Manawatu	2,680	40,000,000	75,800	Palmerston North.
Hawke's Bay	3,070	28,550,000	57,800	Napier.
Wairarapa	2,230	17,770,000	26,250	Masterton.
Poverty Bay	2,097	15,100,000	31,500	Gisborne.
Nelson	2,460	9,515,000	30,570	Nelson.
Westland	6,254	4,525,000	26,820	Not fixed.
North Canterbury ..	4,290	56,700,000	162,750	Christchurch.
South Canterbury ..	4,326	29,500,000	61,850	Timaru.
Southland	11,000	27,300,000	71,850	Not fixed.

The Council's proposals for the setting-up of catchment districts throughout New Zealand provide for not more than twenty-four districts. The most urgent areas are being dealt with first, and it may be some years before all the districts are constituted.

Soil Conservation Districts

Regulations have been issued covering the administration of soil conservation districts, which may be constituted in terms of section 13 of the Act. No districts have as yet been declared, but investigations are proceeding into the matter of the selection of suitable areas. For the most part these will be the more sparsely populated areas where there are no large river catchments and where Catchment Board control is not warranted.

Soil Conservation Reserves

Soil conservation reserves are areas which require to be under the direct ownership and control of the Council for the purpose of undertaking soil conservation measures or for demonstration or research projects. They are acquired under section 16 of the Act, and it is proposed to select areas in the different districts which are typical of the various erosion problems and to carry out, as trained staff and equipment can be made available, investigations into the technique of remedial work. The undermentioned areas are being dealt with at the present time, while suitable sites for other areas are being investigated.

Ruatoria.—Action is in hand to acquire an area of approximately 1,500 acres of badly eroding country behind Ruatoria Township. Control works are necessary to check erosion, which has already imperilled portion of the township and communication. The area will also be very suitable for experimental work.

Ihungia.—An area of badly eroded country inland from Te Puia Springs being acquired in conjunction with the Main Highways Board for experimental work and for planting as a protective work for the highway.

Waikoau - Te Ngaru.—An area of about 1,000 acres adjoining the Napier–Wairoa State Highway 20 miles north of Napier. Erosion on the steep hillsides has been most spectacular and has caused heavy damage to highway, which has been repeatedly blocked to traffic. The area is typical of the hill country in the district, and results from preventive measures will be watched with interest. Work of planting this area in conjunction with Main Highways Board is about to begin. It is proposed to plant blocks of various species of trees, particularly macrocarpa, Oregon, and robinia. The work will have a considerable protective and economic value, besides its experimental value.

Esk.—Arrangements are still proceeding for the acquisition of property. In the meantime an aerial survey of the whole area has been made.

Wither Hills.—This locality is two miles south of Blenheim and exhibits very severe sheet and gully erosion and a very large part of the original cover and fertility has been lost. An area of 400 acres of this hill country only 2 miles from Blenheim has been acquired and closed to grazing. Differential planting has been carried out with various trees, grasses, and plants.

Wangamoa.—This reserve is located in the Wangamoa Valley between Nelson and Havelock, being an area of poor and partly farmed bush country adjoining State forest. No operations have yet been possible.

Research and Experimental Work

There can of necessity be very little activity in the field of research work, due to the lack of trained personnel and the impossibility of obtaining the necessary equipment. However, in association with Departments and the district committees, a certain amount of preliminary planning is being done. The Council has assisted in the establishment of plots in the high country of the South Island for vegetative trials in erosion control. The Council also imported grasses for trial in these areas.

A small amount of kudzu seed, the plant which has gained a high reputation in America, was imported and plants successfully raised in Whangarei and Gisborne for distribution throughout New Zealand later. Similarly, one thousand rooted cuttings of shipmast locust (*Robinia pseudoaccicia erectissima*) were imported and distributed for trial in protection against sheet and gully erosion.

The Council is taking considerable interest in the operations being carried out on the Molesworth Station, situated in the headwaters of the Awatere Valley, Marlborough. This property, although not managed in any way by the Council, being under the control of the Lands and Survey Department, is virtually a vast experimental area in the management of high country.

The Council has initiated a number of important river surveys enumerated under the heading "Works," but in this instance also the work is limited by available staff.

Research work is planned and will be put into operation as soon as opportunity offers on the reserves referred to in the previous section.

Educational and Publicity Work

The Council's programme of educational and publicity work was inaugurated with the distribution to farmers, local authorities, schools, libraries, banks, stock and station agents, and other organizations of a bulletin, "The Menace of Soil Erosion in New Zealand," published by the Council. The demand created was such that a reprint has been necessary. Three bulletins kindly made available by the Department of Scientific and Industrial Research dealing with the depletion of vegetation and the extent of soil erosion in New Zealand were made available to secondary schools and agricultural colleges. There is an encouraging demand from schools for literature on the subject, due, no doubt, to the greater prominence of social studies and agriculture in the curricula of these schools. Three further bulletins have been prepared, but have been delayed by the demands on the existing printing facilities.

The Council has also published a book, "Soil Erosion in New Zealand," by K. B. Cumberland, Lecturer in Geography, Canterbury University College. This work is a valuable survey of the problem of soil erosion in New Zealand and is very fully illustrated with photographs and maps. This is the first major publication on the subject as it affects New Zealand, and is the correlation of information drawn from many sources, and these, combined with the author's very keen observations, make the work a very valuable one.

Four film strips illustrating the various aspects of soil erosion and conservation, emphasizing the value of the prevention of fire and the control of grazing, were prepared and released to Catchment Boards, schools, and colleges for lecture and teaching purposes. Further film strips are proposed, and to cater for these an extensive library of photographs is being built up.

The importance of sound films has been evidenced by the interest displayed in the showing of a number of American films on conservation and river subjects. Arrangements are in hand to prepare several New Zealand films. To enable these to be shown to those most concerned a mobile movie projection unit is proposed.

Several agricultural and pastoral shows were visited during the year and enlarged photographs of local erosion were exhibited and talkie films screened. A practical demonstration by a working model which illustrates the varying rates of soil and water loss under different conditions of cover was the subject of considerable interest.

During the year numerous requests were received for publications, photographs, film strips, screening of films, and lectures, and were complied with.

The public interest evinced is encouraging and the Council is building its facilities to meet future demands.

INSPECTION

During the year the Council had the opportunity of visiting the Otago, Southland, and Wairarapa districts.

WORKS

The following is a brief resume of the principal activities in the various districts :—

Whangarei District.—In the scheme for the relief of flooding at Pokapu the road and railway bridges over the new channel are completed, and the channel is complete except for deepening at bridge-sites.

Auckland District.—The stop-bank work to protect the Matatoki Drainage Area, in Thames County, is well advanced, and arrangements have been made for proceeding with the Wharepoa Drainage Area.

Tauranga District.—Heavy stone protection along the Whakatane River near Whakatane Borough was authorized during the year, but it has been impossible to do any of the work due to shortage of labour. Protection on the right bank higher up using willow mattress work is partly completed. Heavy protection work above the Ruatoki Bridge is well in hand. An engineering survey to prepare a scheme for the control of the Whakatane River was commenced during the year.

Taumarunui District.—The stop-banking work protecting Taumarunui Borough was completed. Arrangements have been made to let a contract for 9 chains of concrete protective work.

Gisborne District.—The Waipaoa River improvement work was put in hand. The mouth of this river has travelled 2½ miles south along the coast and the work involves the construction of a cut-off groyne and pilot channel to form a new mouth to shorten the course. A double-pile permeable groyne 800 ft. in length is well advanced and pilot channel has been cut in readiness for development by a flood. Two small works brought about by the heavy flood of March, 1944, the repair of the Waipaoa Settlement stop-bank, and drainage-works to dewater Torries Lagoon were completed.

Napier District.—No construction works were carried out, but a number of important surveys were completed. These include the extensive survey of the Tukituki River, the survey of the Manawatu River near Woodville, and the surveys of the Lower Esk and Pakuratahi Valleys for flood control.

Wanganui District.—In the Rangitikei River the development of a heavy meander in the lower reaches caused heavy erosion on the right bank in the vicinity of Flock House. Two diversion cuts totalling 130 chains in length were constructed by bulldozers through coarse gravel-beds with a view to full diversion of river to an improved centre-line. The initial development of the cuts has been satisfactory.

Wellington District.—Manawatu River : The major work has been the completion of the Whirokino Cut, which shortened river by 5½ miles. The pilot cut involved about 400,000 cubic yards of excavation. The cut has developed splendidly and has already improved flood and drainage conditions in the lower river. A further cut comprising 30,000 cubic yards of sand and shingle is being excavated by bulldozer to improve the alignment of the river at Walker's Road, a point about 1 mile above the Longburn Bridge : an extensive survey is in hand between Palmerston North and Ashhurst. Development works have also been undertaken by the Manawatu-Oroua River Board. These represent the construction of a new flood-gate at Koputaroa and the setting-back of low stop-banks in the lower river. The excavation of Tapunga No. 2 Cut is well advanced in line with the excellent development of No. 1 Cut upstream. Further cuts at Holden's No. 1 and a pilot cut at Koputaroa were completed. Puklowski's Cut, on the Oroua River, is in hand. A considerable amount of heavy bank protection was carried out by the Makerua Drainage Board.

Otaki River : Further repair to bank protective works were carried out near racecourse, also a survey of lower river in readiness for the heavy channel excavation planned for next year.

Waikawa Stream : The mouth of this stream had moved for some miles south along the coast. A narrow channel was excavated by bulldozers across the coastal sand-spit and has scoured very successfully, reducing the course by 1½ miles.

Ruamahunga River : Heavy repair works have been carried out on Ruamahunga River and tributaries. These include heavy gabions on the Waiohine River, earthquake repairs to Kahautara River Board's stop-banks, and routine repair work near Masterton.

Hutt River : A survey is well advanced for the preparation of a comprehensive scheme for flood control of river up to the Taita Gorge.

Nelson District.—Wairoa River : A survey for flood control is in hand at Brightwater and clearing-work has been completed in several places.

Motueka River : The first instalment of protective work against erosion on the right bank has been carried out over a length of 5 chains using heavy stone from Takaka Hill. The work required to be particularly massive, as it provides security for Motueka Borough. Farther upstream 120 chains of clearing-works were carried out in the Glen Rae Stream.

Riwaka River : Willow-clearing has been carried out and also repairs to the stop-bank.

Takaka River : A major stream diversion is in hand in vicinity of Takaka to develop a straight course away from a point where erosion is acute. The work is 85 per cent. complete, representing over 20,000 cubic yards.

Greymouth District.—Oparara River : Further stone protection has been carried out to check bank erosion, and the extension of the stone mole to straighten mouth is in hand.

Karamea River : Stone-work protection was completed at Hird's and Simpson's, together with miscellaneous small works.

Little Wanganui: Heavy clearing was carried out in stream-bed following extensive flood-damage work involved the clearing of trees, rubbish, and accretions of shingle by bulldozer and has effected considerable improvement.

Taramakau River: A commencement was made with the construction of a stop-bank and protective stronghead, but progress has been severely interrupted by floods.

Hokitika River: Near Camelback a scheme of works has been carried out to prevent the river breaking into a new course. The scheme provides for a high cut-off stop-bank protected by massive concrete and gabion stronghead. Work has been interrupted by floods, but is nearly complete.

Poerua River: A commencement has been made with heavy stone protection along a length of 20 chains to prevent river invading the Hari Hari Settlement.

Christchurch District.—A very severe flood occurred towards the end of February, 1945, causing heavy damage, especially in the Ashley and Orari Rivers and in the Timaru district. Repair work is continuing.

Ashburton River: Further work has been carried out clearing heavy willow from stream-bed and erecting stop-banks. To date 2,300 acres have been cleared in floodway and stop-banks built for 20¾ miles, and a substantial portion of the work has been handed over to the Ashburton County for maintenance. The effectiveness of the work was well demonstrated in the recent floods.

Ashley River: A channel diversion was carried out in lower reaches to straighten river on a new centre-line, and heavy development on this line occurred during the February flood.

A considerable number of surveys were carried out, notably in connection with Lake Ellesmere drainage, improvements to the Kowhai River at Kaikoura, and Russels Flat drainage in Tawera County.

Dunedin District.—Taieri River: Repair works occasioned by the flood of 1944 were partly completed when the further heavy February floods occurred. The main control works were not damaged, but further repairs will be necessary in East Taieri. The widening and deepening of Lee Creek has been continued. A comprehensive survey of the Taieri River scheme is in hand.

Clutha River: The farming area and the river-control works in the vicinity of Balclutha were very severely damaged in the February flood of 105,000 cusecs. This was by no means a record, but inundation was extensive in all areas and severe breaches occurred in every stop-bank system and an especially large one at Stirling. This breach was repaired with great difficulty because of the high river, swift current, and loose material of river-bank. A considerable time must elapse before repair works can be completed. Further works have become necessary as a result of the flood, especially heavy stone protection of caving river-banks. A complete survey of the river has been commenced with a view to preparing a comprehensive control scheme.

Pourakino River: A further 40 chains of snagging was completed.

Oreti River: A survey has been initiated for preparation of a control scheme and 32 miles of river surveyed.

The Council places on record its appreciation of the services rendered during the year by its small but efficient staff.

Signed on behalf of the Soil Conservation and Rivers Control Council.

W. L. Newnham, M.Inst.C.E.,
Chairman.

APPENDIX G

ANNUAL REPORT OF THE DIRECTOR OF HOUSING CONSTRUCTION

The Director of Housing Construction to the Hon. the Minister of Works.

Sir,—

I have the honour to submit the following report on the Department's activities for the year ended 31st March, 1945:—

(1) *General.*—The past year has probably been even more difficult than its predecessors for the Department and contractors engaged on housing work, as shortage of materials and fittings—for instance, timber, bricks, interior linings, stores, &c.—has considerably delayed the completion of houses which in normal times would have been finished and occupied. In addition, the more or less sudden transfer of building organizations to housing work at the conclusion of the main defence programme generally unbalanced the allied trades, so that, although the actual building work could in most cases proceed, sub-trades were not in a position to carry works to completion as expeditiously as desired. Furthermore, the sharp increase in building operations necessitated the simultaneous prosecution of engineering development and house-construction, with resultant interference and delays.

Despite these difficulties, however, 1,969 houses were completed during the year, much more than doubling the previous year's total of 880.

(2) *Building Construction.*—(*a*) The majority of houses being erected by the Department are of standard wooden construction sheathed with timber, asbestos-cement sheets, brick veneer, or plaster, with tile or asbestos roofing. The difficulty in the supply of materials and labour has restricted to a large extent the potentialities of prefabrication, but every endeavour has been made to assist the contractors to enable them to erect houses with a minimum of delay consistent with sound building practice.

(*b*) With a view to conserving timber, many types of construction have been investigated, mainly using concrete or concrete products. In every case where schemes have been submitted to the Department, careful consideration and investigation have been given to their practicability and potentialities. Excluding flats, 89 units utilizing concrete or concrete products are under construction, and 180 are in the process of negotiation. Experiments are also being carried out with various types of boxing for concrete construction.

Of the various types of concrete construction, concrete-bearing wall construction comprises the largest proportion. Other types of construction being investigated include concrete blocks, cavity concrete with tile or concrete roofs, interlocking panels of pumice concrete, sawdust-cement panels, concrete blocks with reinforced-concrete frame, reinforced pumice-concrete panels and concrete frame, and " No Fines " concrete.

The use of concrete floors and concrete roofs is being investigated and experimental houses erected as a result of research, and it is hoped that the usual difficulties associated with the use of these materials in house construction will be overcome.

The use of Oamaru and other suitable building stone is being subjected to test to ascertain the potentialities of its greater use in small house construction.

Waterproof plywood has been developed and has become a factor in the building industry. Several houses in this material are to be erected in the Auckland district.

(*c*) Several schemes for the development of large blocks of flats in the four main centres have been prepared during the past year, there being two blocks totalling 61 units in Auckland ; ten blocks totalling 78 units in Wellington, Petone, and Lower Hutt ; and eight blocks comprising 330 units are either ready for tendering or in an advanced stage of designing in Auckland and Wellington.

(3) *Purchase of Land.*—So far as depleted staff would permit, the Department has continued its active policy of purchasing land in advance of immediate building capacity, in readiness for the accelerated programme of house-building when the materials and labour problems ease. Very few serviced sections are now available for acquisition in the main centres, and the Department has had to concentrate more on larger blocks for subdivision and development. During the year land was purchased sufficient for 2,145 building-sites, bringing the cumulative total to 42,061. The Department is holding land for 25,000 houses, including sections on which building is proceeding, but much of this land is still undeveloped.

(4) *Land Development.*—Steady progress has been maintained in the planning of land acquired for development preparatory to the commencement of the engineering and building construction work. Several large projects have been treated, notably areas in Lower Hutt at Taita (1,600 houses), Mount Roskill, Auckland (1,100 houses), Caversham, Dunedin (320 houses), and Tamaki, Auckland (8,000 houses), the last named in broad outline only. These schemes are more or less complete entities and entail the planning of all residential amenities, including shops, community centres, recreation reserves, schools, &c.

The actual development of the land has been prosecuted to the utmost extent permitted by the prevailing shortage of qualified engineering staff and of labour and materials. The work comprises the construction of streets, sewers, and water reticulation, levelling of sections, and provision of paths, fences, and hedges. During the year 21 miles of streets have been constructed to a stage approaching completion, together with storm-water drainage, sewerage, and water supply.

(5) *Standards.*—The Department is maintaining the standards of living accommodation adopted at its inception. From time to time minor alterations have been made to designs as dictated by materials available and expressed desires of public opinion, but, despite rising costs, the standard provided still conforms to the policy of improving the people's housing.

(6) *Housing Improvement.*—The Housing Improvement Bill, designed to prevent the growth of slums and to improve housing conditions in areas where the standard of buildings is not satisfactory, was introduced into Parliament last year and passed its first reading. It has now been circulated to all bodies which would be responsible for its administration for their information and comment. The Bill has received general approval, and some useful suggestions have been forthcoming from the local authorities. These will be given consideration before the Bill is re-introduced for its second reading during this session of Parliament.

(7) *Rural Housing.*—(*a*) With a view to maintaining and increasing primary production, the Department, in collaboration with Primary Production Councils and the State Advances Corporation, undertook the provision of both temporary and permanent rural housing for farm workers under the Rural Housing Emergency Scheme, 1944. Costs are temporarily met out of the Housing Construction vote with a subsidy from the War Expenses Account.

This scheme includes temporary accommodation utilizing surplus Army huts on farms where the conditions do not warrant or pending the erection of permanent dwellings. Hutments, which may be hired or purchased outright, are supplied to the farmer complete and ready for occupation.

The permanent accommodation comprises two standard designs with the usual amenities to be found in to-day's modern house, and with provision for additional rooms at a later date. These dwellings may be purchased for cash or finance may be arranged by the applicant through the State Advances Corporation.

The period for application was extended from the 30th November, 1944, until the 31st March, 1945, for the benefit of the farming community, and at the closing date a total of 467 temporary and 82 permanent dwellings has been approved, with a number of applications still under action.

Despite obvious difficulties in arranging erection in rural districts, the Department, by affording the scheme first priority in man-power and materials and by negotiating group contracts wherever possible, is concentrating its resources on providing this accommodation at the earliest possible date, thus considerably assisting the Dominion's drive for increased food production as part of its contribution towards the common issue of the Allied Nations.

(*b*) The Department has also undertaken the erection of farm houses in connection with the Land Settlement Scheme operated through the Department of Lands and Survey.

Approximately thirty special designs of houses adapted to varying site conditions and accommodation requirements have been prepared in close collaboration with the Department of Lands and Survey. Farm buildings, including milk-sheds, implement-sheds, piggeries, and wool-sheds, are included in this scheme, and these also have been the subject of research to establish practical standards for the purposes of this scheme.

In some cases work in connection with this scheme has taken the form of extensive alteration, subdivision, and removal of existing buildings. Every endeavour has been made to make the maximum use of present buildings, even to the extent that, when nothing else can be done with them, the demolished materials are used as far as is practicable for new houses or sheds.

So far work has been undertaken in connection with nearly forty land blocks, in most cases involving subdivision, making a total of approximately one hundred and thirty holdings. Contracts have been let or completed for over fifty farm houses. Preparatory work for building contracts is in hand for approximately eighty further farms. Most of the farms are dairy propositions, and in nearly every case a milking-shed and an implement-shed are required in addition to the house.

(8) *Man-power.*—The man-power position in the building industry has improved to some extent, the total labour force employed directly by the Department and contractors at 31st March being 3,645, as against 3,170 a year ago. It is anticipated that this number will be considerably increased as men in the Armed Forces are released, but, due to the unbalance in the allied building trades, it may be some time before the increased man-power will take full effect.

(9) *Expenditure.*—The cumulative net expenditure up to 31st March, 1945, for the purchase and servicing of land, and the erection of joinery-factories and houses, including all administrative charges, amounted to £28,390,700, while liabilities and commitments amounted to a further £5,956,900. The net expenditure for the year under review was £4,445,600. The total cost of administration of the Department (exclusive of interest charges) from its inauguration to date was £785,000, or 2·86 per cent. of the net expenditure (excluding administrative costs and interest). The percentage for the year ended 31st March, 1945, was 2·96.

(10) *Building Control.*—With the full implementation of what is virtually a normal peacetime building programme, the work of the building control organization has considerably increased during the year, and its duties have become more involved and difficult due to shortage of materials.

Applications for building permits are progressively increasing in number, and the gap between supply and demand has widened, for, although the labour force in the industry has increased to some extent, the material supply position in a number of major building commodities continues to deteriorate. It is quite evident that for the present there can be no relaxation of control.

During the year some 25,000 building applications have been approved, amounting in value to approximately £15,000,000. In addition, thousands of applications concerning the release of controlled materials have been dealt with. With the decline in the supply position this phase of the work is naturally growing in volume and intensity.

(11) *Carpentry Training Schools.*—The Auxiliary Workers Training Emergency Regulations 1941 provided for the establishment of schools for the training of adult workers, orginally under the control of the Labour Department, but since early in 1944 administered by the Rehabilitation Department. The first school was established at Miramar, Wellington, and eleven are now in operation throughout New Zealand. After the trainees have the necessary standard of efficiency the Housing Construction Department arranges contracts with the Rehabilitation Department for the labour involved in groups of State houses. Up to 31st March, 1945, sixty-four contracts have been let in nine towns, involving 419 houses, of which 106 have been completed. The scheme is proving very successful and is being extended to other towns.

In addition to active house-building, the trainees are also manufacturing certain joinery in their schools, and the Housing Construction Department specifies the use of these items by housing contractors when suitable and available.

(12) *Statistics.*—The cumulative progress of the Department over the successive years since its inception as at 31st March is as follows :—

——	1937–38.	1938–39.	1939–40.	1940–41.*	1941–42.*	1942–43.*	1943–44.*	1944–45.*
	Units.	Units.	Units.	Units.	Units.	Units.	Units.	Units.
(*a*) Houses advertised	3,172	6,698	11,071	14,084	17,029	17,443	20,910	24,581
(*b*) Contracts let	2,507	6,188	10,353	13,647	16,522	16,799	19,487	22,349
(*c*) Houses under construction ..	1,560	2,326	2,847	2,444	2,033	1,209	2,078	3,442
(*d*) Houses completed and handed over for occupation	399	3,064	6,459	10,425	13,633	14,892	15,722	17,741
	Towns.	Towns.	Towns.	Towns.	Towns.	Towns.	Towns.	Towns.
(*e*) Towns and localities work conducted in	70	106	121	137	141	146	153	184
	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.
(*f*) Principal contractors engaged..	145	240	291	326	345	346	406	506
(*g*) Payments—	£	£	£	£	£	£	£	£
Land and services ..	298,500	890,600	1,638,900	2,549,100	3,086,400	3,665,500	4,212,300	4,934,000
Dwellings-construction—								
Housing Department ..	1,053,600	4,311,400	8,567,200	13,075,300	16,376,500	17,316,200	18,326,200	21,690,600
Other Government Departments	..	..	26,700	128,400	191,400	325,200	523,700	678,600
Joinery-factories, including machinery	48,900	50,500	52,600	49,400	45,900	46,700	46,700	45,700
Vehicles, plant, and equipment	2,600	6,200	12,900	17,200	19,100	21,600	23,100	30,600
Interest during construction	6,600	21,000	31,000	52,200	93,500	117,600	154,000	226,200
Administration	66,200	166,400	281,300	406,400	539,800	685,700	659,100	785,000
	1,476,400	5,446,100	10,610,600	16,278,000	20,352,600	22,178,500	23,945,100	28,390,700

* Work retarded due to the temporary diversion of contractors and the Department's organization to defence works.

(13) *Building for other Departments.*—In the statistics quoted above it will be seen that the Department has been increasingly engaged on the building of dwellings for other State Departments. Numerous other building projects entrusted to the Housing Construction Department include community centres, halls, and portable and temporary class-rooms. Some houses have been erected from the component parts which were originally manufactured for Army occupation in the Pacific area, and army huts, cookhouses, &c., have been used to accommodate single men in forestry camps.

During the year work for other Departments accounted for an expenditure of £198,500, involving eighteen Departments who have availed themselves of the Housing Construction Department's organization and facilities.

(14) *Proposals for Ensuing Year.*—It is confidently anticipated that materials and labour will become available in increasing quantities, and the Department will take the fullest advantage of the improved position to accelerate its housing programme. Provision for a total expenditure of £5,590,000 has been made in the current year's estimates, and the envisaged programme provides for the completion of 3,500 house units.

The State Advances Corporation continues to offer building loans to those desiring to erect houses for themselves, and during the past financial year has granted 1,070 building loans totalling £1,254,810, exclusive of loans granted to local authorities under Part III of the Housing Act, 1919, amounting to £294,800.

(15) *Staff Accommodation.*—The appointment of the extra staff necessary to implement the policy of decentralization is delayed in all centres by the lack of adequate office accommodation. In Auckland and Wellington particularly even the present staffs are working in conditions of serious congestion.

(16) *Administration.*—The Department is still experiencing great staffing difficulties as many of its trained officers are still serving with the Forces, and much of the work has had to be entrusted to wartime appointees and personnel directed to housing by the National Service Department. The position is, however, steadily improving. The total staff of the Department at 31st March, 1945, was 586, of whom 82 were absent with the Forces.

Under the Ministry of Works Act, 1943, the erection of dwellings and other works undertaken for the purposes of Part I of the Housing Act, 1919, together with setting-apart, reservation, acquisition, development or improvement of land, or any other work for the purpose of the said Part I, is administered by the Minister of Works, and any moneys required for any purpose hitherto paid out of the Housing Account may now be paid out of that account, or, subject to appropriation by Parliament, out of the Public Works Account. The Housing Construction Department's inclusion within the framework of the Ministry of Works is in process of implementation, and the resultant co-operation between the various Divisions in this Ministry will, it is confidently hoped, result in increased efficiency and economy.

(17) *Post-war Developments.*—Just as soon as the man-power and material position will permit the Department will resume the house-building programme which was interrupted by the war, and several major developments are under investigation. Every effort is therefore being made to complete as far as possible the necessary planning, designing, and preliminary land-development, but this effort is being hampered by the prevailing shortage of qualified technical and clerical staff and, to some extent, also of labour for engineering works.

In conclusion, I have pleasure in recording that, despite staffing and accommodation difficulties, loyal and efficient service has been rendered by all members of the staff, and relations with building organizations and the public generally have been excellent.

I have, &c.,
G. W. Albertson, A.M.I.C.E.,
Director of Housing Construction.

Approximate Cost of Paper.—Preparation, not given; printing (641 copies), £75.

By Authority: E. V. Paul, Government Printer, Wellington.—1945.

Price 9d.]